MODEL AIRPLANE NEWS

MAKE TRUSS RIBS

E WORLD'S PREMIER R/C MODELING MAGAZINE

48120

November 1997

Giant Warbirds

N ACTION page 30

R/C TEAM WORK

EROTOW SOARING MEET

CONSTRUCTION

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Lyka Jet

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- FOX .46 BB ABC
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Publisher YVONNE M. DeFRANCESCO
Associate Publisher SHARON WARNER

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Dave Baron, Joe Beshar, Mike Billinton, Bernard Cawley, Mike Cherry, Roy L. Clough Jr., Hal deBolt, Don Edberg, Bob Fiorenze, Dave Garwood, Dave Gierke, Bill Griggs, Henry Haffke, Tom Hunt, Michael Lachowski, Mike Lee, Andy Lennon, George Leu, Mike McConville, Jim Newman, Vic Olivett, Jim Onorato, Dan Parsons, Dave Patrick, Dave Platt, Roger Post Sr., Randy Randolph, Jef Raskin, Guy Revel, Carl Risteen, Jim Ryan, Jim Sandquist, Dave Shadel, Keith Shaw, Jim Simpson, Faye Stilley, Bob Underwood, Roy Vaillancourt, George Wilson, Nick Ziroli.

AirAGE

100 East Ridge, Ridgefield, CT 06877-4606
(203) 431-9000 • fax (203) 431-3000
INTERNET *man@airage.com*

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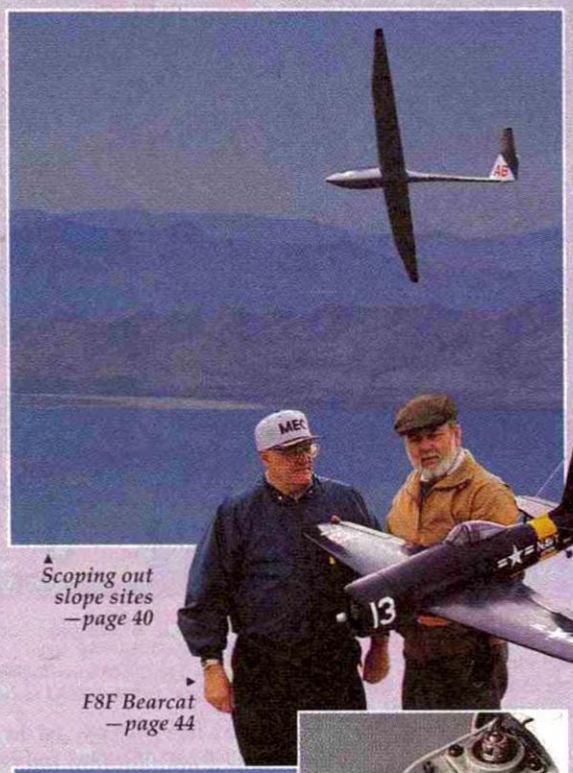

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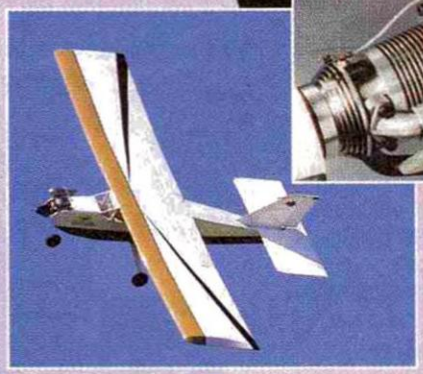
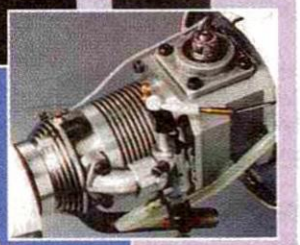




Final Approach —page 186

Flyin' King —page 50

ON THE COVER: *main photo—Del Runkle's scratch-built Boeing F4B-2 biplane on a flyby at the 10th Annual Miniature Warbirds Festival (photo by Gerry Yarrish). Insets—a glider is towed skyward at the annual Elmira Aerotow soaring meet (photo by Dave Sanders). The Lyka Jet does a blistering flyby (photo by Walter Sidas).*

Reviews

Columns

EDITORIAL

by LARRY MARSHALL

HAVING FUN!

One of the ironies of editing a model aviation magazine is that it tends to cut into your flying time. While we do get to attend a lot of flying events, we are more often behind a camera than a set of gimbals. But when given the opportunity to fly and have fun, we're like most modelers and jump at the chance to get some air time. When we found ourselves with an unscheduled weekend that coincided with an electric fun fly organized by Ron and Renee Torrito and the Northern Connecticut R/C Club, Gerry, Debra and I decided to take advantage of our good fortune.

I prepped some of my planes and stuffed a motor into one I hadn't flown in a while. Needing to test-fly it before the meet (I don't like to "test" a model at a flying event), Gerry and I decided we'd put in some flights the evening before. When I showed up at Gerry's house, however, I found him–the archetypic "Give me gas engines or give me death" kinda guy—busily stuffing an AstroFlight Cobalt 15G into a Nifty 50 so he'd have an electric airplane to fly at the impending event. Does this sound reminiscent of nights you've spent in your basement before events? I just couldn't help but chuckle a bit as I dived in to help.

After we had finished our conversion, we headed to a local park. We flew against a setting sun, and a young deer stood calmly at the edge of the field, watching a couple of crazed modelers using the area between second and third base as the runway. Our silent electrics seemed to suit our brush with wildlife just fine. We had fun in the quiet of that evening, and by the time the sun had finally set, we were happy and our planes were ready.

The next day, the 10th running of the NCRCC Electric Fun Fly ran like clockwork. Ron managed to use his connections to provide a superb day of no wind, sunny sky, flying weather for us. Renee produced a large batch of her world famous (at least in the electrics community) chocolate chip cookies and all concerned provided what is the real reason we all attend these events—camaraderie.

Of course, we flew; we all flew a lot. But mostly we had fun being in one another's company at a no-pressure fun fly. And so it goes in this hobby; it's the people who really count. It doesn't matter what you fly; it doesn't even matter where you fly. But who you fly with ... that's what makes or breaks our enjoyment. There is nothing sweeter than flying with friends such that, as you're walking out to fly, someone (as Larry Sribnick did at this event) jokes with you by saying "Everyone's watching" and "No pressure." So kudos to all of you who organize events; you are the glue that holds this hobby together. You motivate us. But most of all, you give us a forum to gather and enjoy one another.

WARBIRDS, AEROTOWING AND SLOPE SOARING

And speaking of places to have fun, this month, we have coverage of the 10th Annual Miniature Warbirds Festival and Elmira Aerotow events. These meets represent two fast-growing facets of our hobby. The warbird meets are growing both in number and popularity, and the warbird meet in Schenectady is the granddaddy of them all.

Aerotowing of model sailplanes by model power planes is really taking off (pun intended) as more and more people discover the fun of mixing sailplanes with power planes. While the Europeans have been doing this for a long time, it has been slow to migrate to this continent. But it seems the advocates are making up for lost time. The event at Elmira is quickly becoming Mecca for those pursuing this part of the hobby, as the site is associated with the sailplane museum there, and they have good slope lift most of the time. As you'll see from Dave Sanders' coverage, it's a happening event.

If you'd rather go sloping locally, Dave Garwood will show you how to find inland slope sites. His article should punch a few holes in the myth that you need a coast to slope soar.

PHOTOS BY DEBRA SHARP

One of the participants and some of the airplanes at the NCRCC Electric Fun Fly.

AirSCOOP

by CHRIS CHIANELLI

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

KYOSHO AURUM SPORT 30

F3A World Champion G. Naruke, designer of the Aurum, and Kyosho's Super Quality Series make a perfect combination for the sport flyer who's looking to get into the air quickly to hone his pattern skills. This all-balsa, ARF sport plane features a thick, symmetrical airfoil for extreme maneuvers and stable slow-flight characteristics. Like other Kyosho Super Quality Series models, the Aurum has been taken to a level of completion that's rarely found in the industry today. Even the cowl and wheel pants come reinforced with fiberglass and painted. The model comes in the easy-to-see, brilliant, six-color finish you see here. Rugged Duraluminum landing gear is standard equipment. Specifications: wingspan—52 inches; wing area—591 square inches; weight—4.8 pounds; length—51 inches; engine required: .32 to .40 2-stroke or .48 to .52 4-stroke. For more information, contact Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826. (217) 398-6300; fax (217) 398-0008.

$Innovative Motivation$

Greg Namey of Innovative Model Products has come up with an offer that's not only unique, but may also be just a bit too sweet for some of you scale modelers to pass up. To help promote his scale kit line, Greg now offers to give a free kit to any modeler who qualifies for the Scale Masters using an IMP kit. But wait; that's not all! If a modeler wins first place at the Scale Masters with an IMP kit, Greg will pay that modeler $1,000 in cold, hard cash. For more information on Innovative Model Products' kits and accessories, contact Greg at P.O. Box 333, Remsen, NY 13438; (315) 831-2705.

FLY FOR 1/20TH THE COST

Thanks to ProSpark, it's now possible to run the popular O.S. 1.08 on regular unleaded gasoline—with no power loss when compared with glow operation, according to ProSpark. This is possible because the user can change the spark advance timing electronically while the engine is running for optimum performance—a feature found only on the ProSpark ignition system. Timing returns to 0 degrees at rest, so firing occurs at TDC, giving easy starts with no kick-backs. Also offered is a Walbro carburetor and adapter that provide good fuel draw and reliable performance regardless of fuel-tank position, fuel level or aircraft attitude.

The ProSpark and Walbro carb come as bolt-on units. Only two small holes need to be drilled for the pressure-tap fitting and on the prop-drive hub for a Hall sensor magnet. The unit comes with an R/C, long, glow-plug-size, NGK spark plug. The user need supply only a standard radio switch and 4.8V battery. For more information, contact Cabral Systems Inc., 2459 Tualatin Valley Hwy. #465, Hillsboro, OR 97123-7919; (503) 629-9378; (800) 646-5745; fax (503) 648-2261.

O.S. 1.08 IGNITION

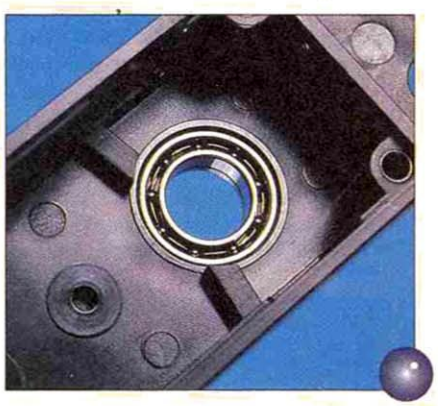
Silent Giant

The latest addition to Flair's Quarter Classic Line is now imported into the USA by Hobby Supply South. The ¼-scale, 148-inch-wingspan Schleicher ASK8 glider is a masterpiece in wood and fabric and weighs only 9.5 pounds! I don't have wing area information yet, but I wouldn't be surprised if the wing loading turns out to be in the single-digit range. This kit was developed from the full-scale factory drawings with a minimum of deviation from exact scale structure. With its self-jigging fuselage construction and conventional wing and tail-feather design, building

the K8 should be a breeze for the average sport modeler. The kit features: Quabec airfoil (15 percent) with 3 percent camber transitioning to 5 percent at the tip, two-piece wing, removable tail feathers, fiberglass nose cone, CNC-machined Tufnol double-acting airbrakes (with over-center locking at full retraction), two R/C releasable towhooks for winch or air-tow use, lightweight wheel and pre-laminated wooden skid/belly, illustrated instructions with many isometric views and deluxe hardware pack. Radio channels: required—rudder, elevator and ailerons; optional—tow release and air brakes (two). For more information, contact Hobby Supply South, 1720 Mars Hill Rd., Ste. 8365, Acworth, GA 30101; (770) 974-0843; fax (770) 974-6243.

Ball-Bearing Servo Conversion

For those of you who don't know, LDM Industries make Ball Bearing Conversion Kits for servos. For those of you who do know, their latest addition to that popular line is for Futaba's S3003 standard servo. Once again, for those who don't know, these kits are designed to eliminate the slop and wobble that often develops in the output shaft of a standard, plastic-bushing servo. LDM give you the benefits of ball bearings at a fraction of the cost of a new ball-bearing servo. The retail prices are only $7.95 each or $29.95 for the pack of four. For more information, contact LDM Industries Inc., P.O. Box 292396, Tampa, FL 33687-2396; (813) 991-4277; fax (813) 991-4810.



MIXTURE CONTROL

Ever hit those high weeds at the end of the runway with your scale ducted-fan jet because your fuel mixture went a bit rich? Ever "toast" a piston and sleeve to an expensive engine because the mixture went just a bit too lean on a hot and humid day? Even worse: ever do a forced Kamikaze attack on the rusted out 1951 Packard that's 50 yards out from the landing strip because your mixture went haywire? According to PC/RC, with their new EFR-801, you will never again see a lean or rich

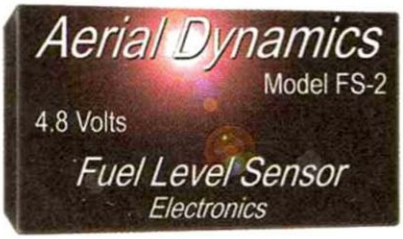
mixture. Mounted in your model, this unit constantly monitors exhaust temperature and makes appropriate mixture adjustments within milliseconds of sensing a temperature fluctuation. I'm told the microcomputer samples the temperature thousands of times per second. The EFR-801 can be programmed so that proper fuel mixture is maintained throughout the entire throttle range. The EFR-801 weighs less than 1.5 ounces and is simple to install. The electronic fuel-regulator valve dimensions are ¼x¼x1¼ inches while the microcomputer control box measures only ¼x1x1½ inches. The temp sensor is approximately the size of a muffler pressure fitting and is mounted in the exhaust header/muffler as close as it can be to the engine exhaust port. This little gadget might prove to be the best "crash insurance" since the dual-conversion receiver. I'll keep you posted. For more information, contact PC/RC, 13807 Amiot Dr., Ste. D, St. Louis, MO 63146; (800) 646-9383; fax (314) 878-0461.

SPOOL UP A *Cyclone*

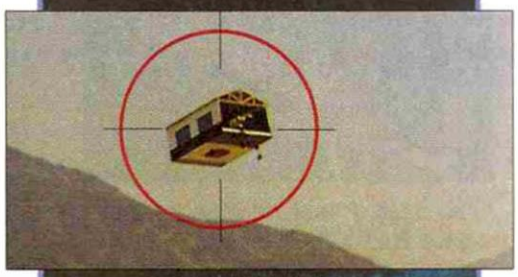
DL Aeromodeles now offer a turbine version of their sleek Cyclone that's intended for the first-time turbine flyer. Designed around the Golden West FD 3/67 turbojet, this sport design makes gaining turbine experience and logging flight time easier. According to DL, this model will prepare you for more complex, scale turbine projects. The fuselage and other molded components are white gel-coated epoxy/glass while the wings and stab come sheeted with balsa. The kit features: complete internal ducting for safer operation and increased thrust; spot-welded titanium tailpipe and cooling pipe; aluminum plug-in wing system; and twin aluminum wing-spar design. The Cyclone packs 850 square inches of area for stable slow-flight performance and has a fuel capacity of 64 ounces without the use of plastic bags. The Cyclone comes with full-size plans and a 70-page instruction booklet. For more information, contact DL Aeromodeles Inc., 4500 Kimber #8, Saint-Hubert, Quebec, Canada, J3Y 8K5; (514) 445-1336.

Warning! Warning!

The Aerial Dynamics FS-2 fuel-level sensor system gives a bright flash warning when you lose track of your flight time and fuel is dangerously low. I know what you're thinking: "But the warning strobe must start flashing every time you do a loop or a roll." Not true!, according to the manufacturer. Delay programming prevents this from happening in most flight scenarios except extended inverted flight. The system features: a gold-plated-nickel fuel-probe tip with Teflon-sealed body; completely wired system, including the CEU (custom electronics universal) power connector; 4.8V operating power; fuel-proof wiring; and epoxy encapsulated electronics circuits. Other specifications are 6mA current drain (static mode), 3A output current (high-intensity strobe pulse) and 1 pulse per second. For more information, contact Aerial Dynamics, P.O. Box 5535, Glendale, CA 91221; (818) 500-8802; fax (818) 500-4011.



SPY SHOT



RV-AIR

With the use of extremely high-power equipment, this spy shot was taken approximately 5 miles from the AeroHome Inc. secret testing ground in Nevada. Seen here in basic split-level airframe design is the Colonial Strato Cruiser—the first to be introduced in AeroHome's plush Travel-Air series. Sources say top-of-the line AeroHomes will include such conveniences as a steel-plated dining table and magnetic chinaware for in-flight dining. Reportedly, this system checks out under loop and roll conditions.

AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 100 East Ridge, Ridgefield, CT 06877-4606; email: man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous number of letters we receive, we can not respond to every one.

NAVY PRIVATEER

For years, I have searched for plans to build a balsawood model of the PB4Y-2, with an 80- to 100-inch wingspan. Can you help? Building this model has been a lifelong dream, ever since I flew in one as combat air crew during the Korean War.

RICK SHAW
Custer, WA

You're right, Rick, the Privateer would make a super model. We're seeing more and more multi-engine planes at fields these days—especially as the popularity (and reliability) of gas engines and electric motors are causing these models to live longer.

I can't help you much with a kit, however. Jack Stafford Models sells a B-24 kit in the size you're looking for, and you could fairly easily modify it into a PB4Y-2. The fuselage of the PB4Y-2 is 7 feet longer and obviously, you'd have to rework the Liberator twin tails into the Privateer's tall and proud single fin. The other details (e.g., side gun turrets) wouldn't be difficult to model, but the kit would kick start the process for you. For more information, contact Jack Stafford Models, 383 W. Chicago Rd., Coldwater, MI 49036; (517) 279-9380. LM

ASTRO MINI-CHALLENGER

A few years ago, AstroFlight produced an electric sailplane modeled after the Challenger. I purchased one of these "Mini Challengers" and was very pleased with it. Unfortunately, I have destroyed it and AstroFlight no longer manufactures this kit. I've heard that a company in Canada may still be producing it. Do you know who now makes this kit, and how I might contact them?

JOHN VEALE
via email

You heard correctly, John. Stuart Pearce, owner of Spirit of Yesteryear, is now producing the Mini-Challenger as well as other Astro planes such as the Viking. He also sells Leisure old-timer kits, which are used by a lot of electric flyers to compete in AMA electric competitions. Give Stu a call; I'm sure he'll be happy to hear from you. Contact him at Spirit of Yesteryear, 40 Holgate St., Barrie, Ontario L4N 2T7, Canada; phone/fax (705) 737-0532. LM

MULTI-BLADE PROPS

This might be a stupid question, but I can't seem to get an answer from my local hobby shop. I am new to this part of R/C and am just curious why (for the most part) they use only two-blade props, instead of three like on the full-size counterpart—the Corsair, for example. I am building the Top Flite plane with a Saito 150 engine. I don't think torque would be a problem, but am still curious. Any help would be appreciated. Thanks for your time!

MIKE UNDERWOOD
via email

There are no stupid questions, Mike. The reason we use two-blade props is efficiency! In fact, a one-blade prop would be better than a two-blade. Because prop blades operate in the wash of the blade ahead of them in the arc, the more blades you have, the closer they are to one another and the less efficient they are at turning torque and rpm into thrust.

The reason high-powered, full-size aircraft started using multi-blade props was ground clearance. To get enough blade area to absorb the power of Pratt & Whitney radials and Rolls Royce engines, they needed multiple blades. They couldn't mount a large enough 2-blade prop and still have sufficient ground clearance.

Presuming you can sacrifice a bit of power for style and scale accuracy, a four-blade prop would look really great on your Corsair. Typically, you'll need a prop with a slightly smaller diameter than the two-blade prop recommended by the engine manufacturer.

LM

P-38s FOREVER

I really enjoyed the article reprinted from *Flight Journal* magazine on flying the P-38 in the September 1997 issue of *Model Airplane News*. These types of articles are of tremendous interest to me, and I wouldn't mind if you did more of them. I know in the past you have printed quick histories of full-size aircraft but to tell you the truth, I already have quite a bit of that sort of stuff lying around the house. On the other hand, I do not have many articles on pilots' impressions, so any articles on actually flying the aircraft, as in the P-38 article, would be greatly appreciated.

The P-38 is one of the most underestimated aircraft of WW II. Our fascination with Allied aircraft such as P-51s, Spitfires and P-47s, with a possible mention of the Corsair and Hellcat, certainly relegates the P-38 to a footnote in most of our minds. We'll often start considering the opposition's aircraft shortly after going through the short list of Allied fighters, without even remembering the P-38. Oddly, though, the P-38 destroyed more enemy aircraft than any other Allied fighter; with a record like that, you would think it would have gotten more recognition than it has over the years.

The P-38 excelled at low-level dogfighting in the Pacific, briefly mentioned in the article—a task for which it was not designed. The P-38 also had an excellent record in the Mediterranean theater. Opinions of its success in the European theater were mixed because of difficulties with the manual turbo controls early in the war. The addition of automatic turbo controls later in the European theater roughly coincided with the introduction of the Merlin-powered Mustang, and so goes history—or our remembrance of it.

IAN DIVERTIE
via email

I'm glad you enjoyed Jeff Ethell's article. You're correct that the P-38 was a formidable weapon. You have me scratching my head, however, over who you're referring to when you say the P-38 was "underestimated." Certainly, the pilots didn't underestimate the 38; they loved the stable gun platform, the dual-engine reliability, etc. Certainly, neither the Allied forces deploying them nor our adversaries underestimated them since, as you point out, the P-38 inflicted considerable damage.

It is true that it has not been the most modeled aircraft, but this has largely been due to the increased complexity of multi-engine models. Even that has changed, though. Nick Ziroli and the Bill Steffes/Frank Tiano team both flew P-38s this year at Top Gun '97. Our January 1997 issue featured Jim Ryan's Speed 400-powered P-38, and examples of this design seem to be popping up everywhere. So, at least when the powerplants are reliable, the P-38 is a popular subject. Your keen appreciation for this great warbird seems to be shared by many. LM

Pilot PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1997. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606.

PYTHON 1100

Peter Doupnik of LaSalle, Ontario, Canada, built this F3A competition aerobatic model from a Piorun Models kit. It has a 72-inch wingspan, is 78½ inches long and weighs 10¼ pounds. It's decorated with Hobbypoxy paints and uses a YS 120AC engine for power. Peter's niece, Nicole, held the model in front of the Detroit skyline while Palmer Johnson shot this photo.

SOUTH PACIFIC SPY PLANE

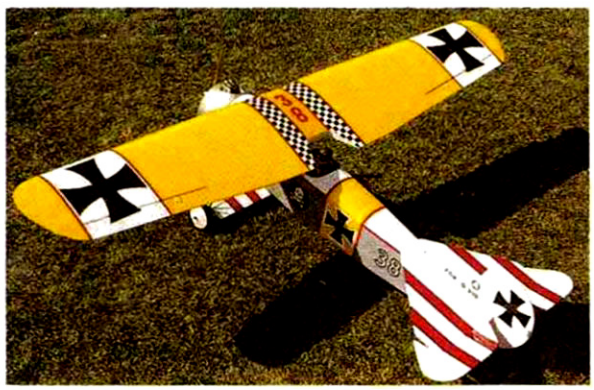
John Tanzer of Cranford, NJ, had never seen the Thomas Morse O-19C observation plane modeled, so he scratch-built one in ¼ scale. John's model has an 8-foot wingspan, weighs 36 pounds and is powered by a 4.2ci American .70 engine. He covered the O-19C with Sig Koverall and painted it with polyurethane and epoxy paint.

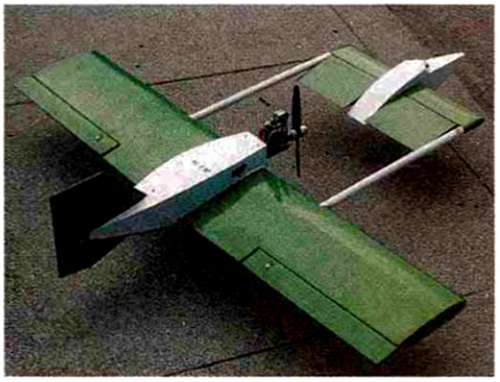
... AND FOR MY NEXT TRICK

Amateur magician Harold Sweet of Hollywood, CA, and his friend Paul Moren built this Midwest G-202 and powered it with an O.S. BGX. Harold says that unlimited vertical isn't a problem; with that paint scheme, we don't think he has to worry about the model disappearing!

OLD-WORLD PLANS

Jim Wahner of Milwaukee, WI, scratch-built this Fokker VIII using very old plans that came from Germany some years ago. He covered the model with MonoKote and equipped it with an O.S. .70 Surpass engine. Jim says that it has proved itself to be a nice flyer.





CODE NAME: GRASSHOPPER

Clarence Huddle of Citrus Heights, CA, designed and built this unique 51-inch-span, 50-inch-long canard. The .40-powered model features all-wood construction with PVC pipe booms and MonoKote covering, and it weighs 6 pounds, 5 ounces. Clarence says, "It's very stable and will do any aerobatics and anything else you might want to try." He's now installing floats on the model.

HAWKER TEMPEST

This Hawker Tempest Mk V is an original design by Ron Daniels of Kitchener, Ontario, Canada. The 29-pound model is powered by a SuperTigre 4500 engine and features a sliding Lexan canopy, retracts and hollow, vacuum-formed exhaust stubs that act as auxiliary cooling air exits. It has an epoxy/glass finish, and all insignia and characters larger than ½ inch are hand painted. Ron detailed the plane with 125 yards of panel lines.

¼-SCALE KITFOX

This scratch-built model of a homebuilt is the handiwork of Bruce Lund of Daphne, AL. Bruce says that the 87-inch-span, 6½-pound model is very aerobatic when powered by an O.S. .40 engine. MonoKote and Model Graphics decals decorate the Kitfox, and Bruce comments, "Landings are a snap with those scale, 5-inch wheels."

RED LION

Gary Santoni of Muncie, IN, scratch-built this 60-inch-span Gilmore Red Lion using Wendell Hostetler plans. The model is powered by a Saito .80 engine and covered with 21st Century fabric with M.T.S. Signs and Graphics decals. Gary says, "I was surprised by how well the plane flies. It is very clean in the air for a plane with so large a frontal area."

DUTCH FLYING FLEA

B. Calis of Naarden, Holland, sent this photo of his ¼-scale Pou du Ciel (Flying Flea), a homebuilt aircraft of the 1930s. He writes, "After 30 years of building ordinary model airplanes, I wanted to make something special, something weird. The Flea, a plan by Randy Wrisley, looked crazy enough ... if you build it light and if you get the angles of incidence right, it will even fly."

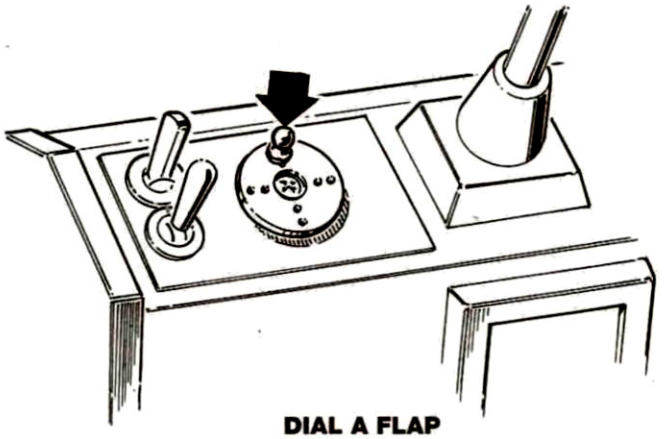
COMET RACER

This DH-88 A.R.D. Enterprises Comet was built by Robert Coats of Raleigh, NC. The model uses a YS .91 4-stroke for power with a McDaniel onboard glow system, and it features operational retracts, flaps and nose landing light. The 28-pound plane is dressed up with K&B paints.

Hints & KINKS

by JIM NEWMAN

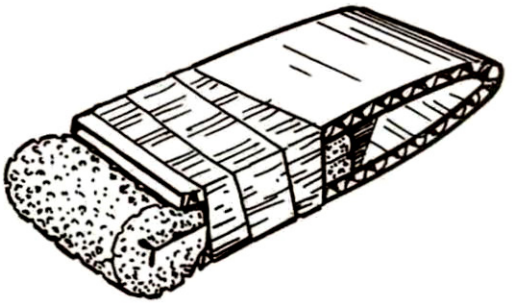
Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



DIAL A FLAP

Replace the standard rotary knob with a ball-link-equipped large servo disk that's installed with the flaps-up position at 12 o'clock. Now you can smoothly dial in any flap setting without looking by using only the tip of your left index finger.

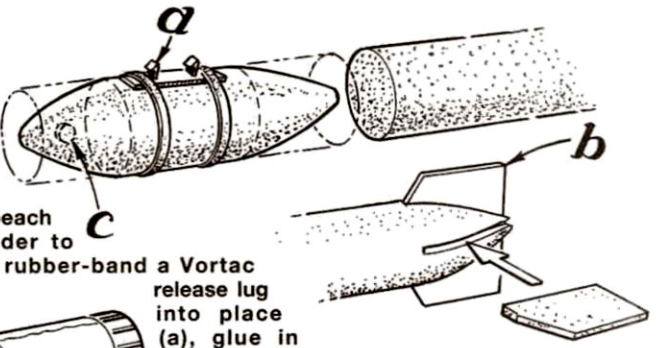
Will Sgarlat, Marstons Mills, MA



DISPOSABLE BRUSH

Fold a piece of foam sponge between stiff cardboard and bind it with tape. These inexpensive brushes work beautifully with varnish, enamel and house paint and don't leave hairs. Be warned: they will melt in dope!

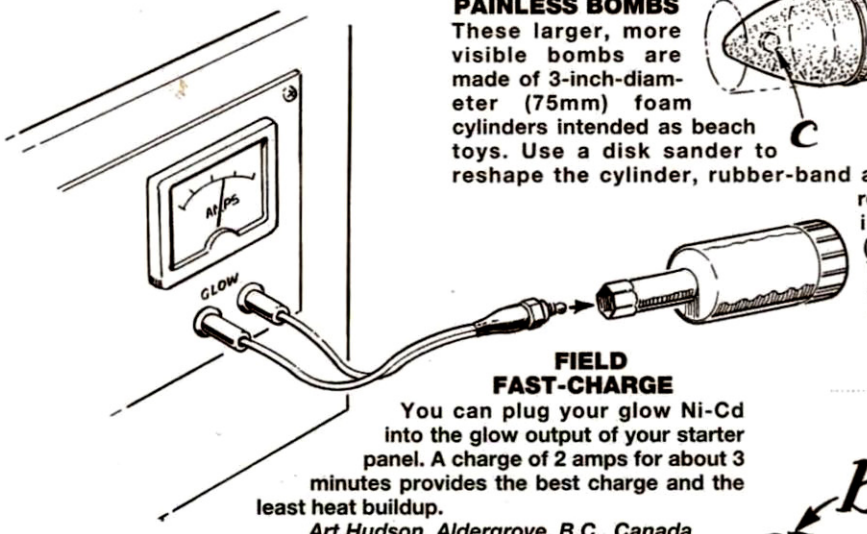
Bob Charron, Lynn, MA



PAINLESS BOMBS

These larger, more visible bombs are made of 3-inch-diameter (75mm) foam cylinders intended as beach toys. Use a disk sander to reshape the cylinder, rubber-band a Vortac release lug into place (a), glue in 1/8-inch (3mm) foam fins, then slit the foam and glue in a small weight (c) to make the bomb a little nose-heavy.

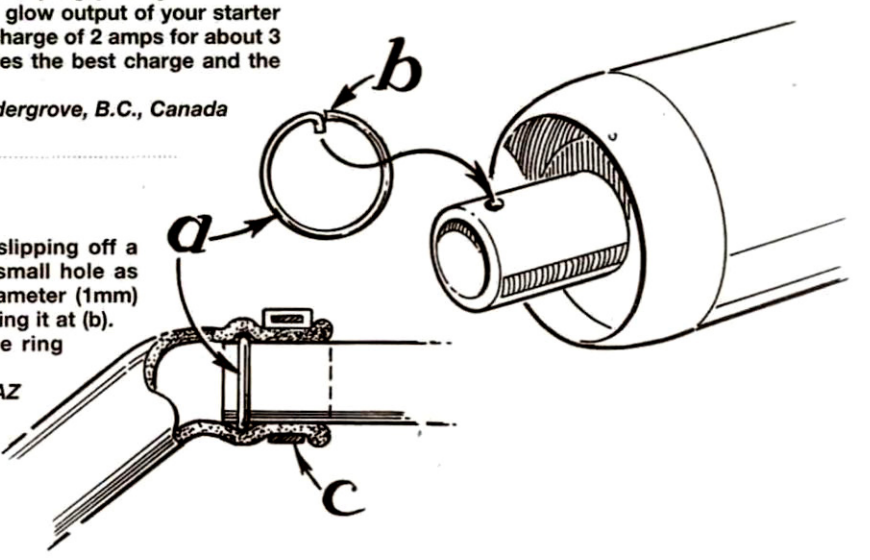
William Lund, Iola, WI



FIELD FAST-CHARGE

You can plug your glow Ni-Cd into the glow output of your starter panel. A charge of 2 amps for about 3 minutes provides the best charge and the least heat buildup.

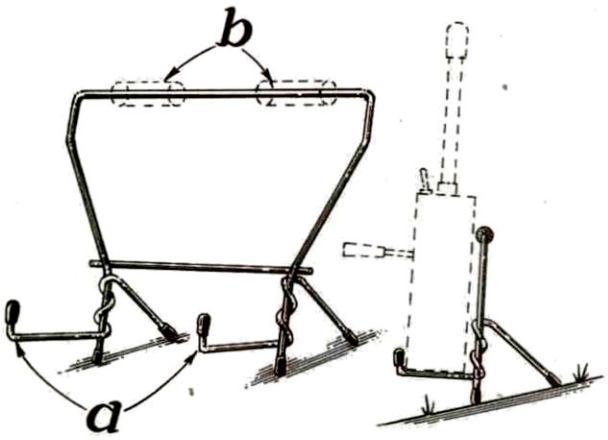
Art Hudson, Aldergrove, B.C., Canada



SECURE PIPE

Prevent the rubber extension from slipping off a smooth muffler outlet by drilling a small hole as shown, then snapping a .040-inch-diameter (1mm) wire ring (a) into the hole, then soldering it at (b). Force the rubber extension over the ring and secure it with a nylon wire tie (c).

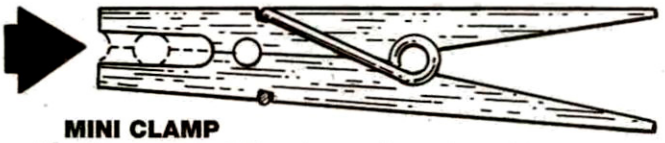
Robert Taylor, Mesa, AZ



TRANSMITTER STAND

A folding document stand (used by typists) is easily converted into a transmitter stand by bending the wires (a) to fit the transmitter. Two pieces of rubber tubing (b) can be split to fit over the wires to prevent them from scratching the transmitter case.

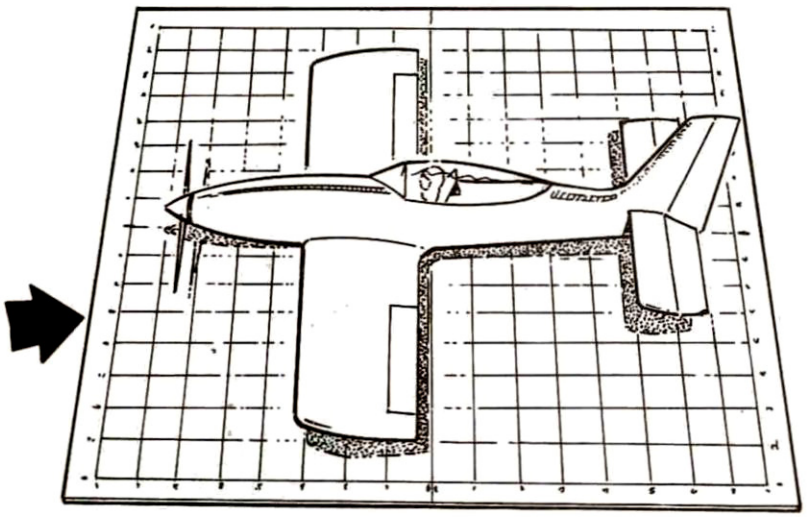
Don Imbriaco, Neptune, NJ



MINI CLAMP

Modify common clothespins as shown to make useful little clamps. Unmodified pins don't open wide enough and will scar balsa.

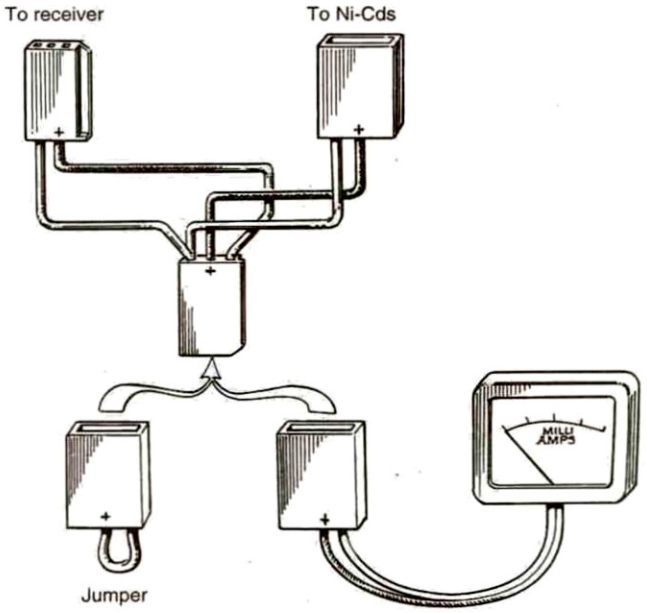
Mark Sirianni, Kane, PA



SQUARING BOARD

Pick up a dressmaker's cardboard sewing board from a fabric store. They fold for storage and are useful for squaring up models during construction.

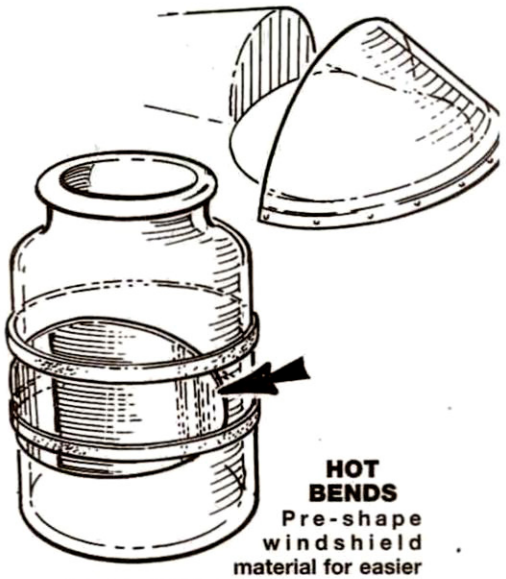
Frank Cavazos, Riverside, CA



CHARGE JACK JUMPER

This does it all. It eliminates the potentially troublesome switch, saves weight, removes clutter and checks servo draw; and you'll know without a doubt whether your radio is off or on. Wire the plugs as shown, and make up the shorting plug jumper and a lead to your meter. Charging is done as usual, and you switch it on by plugging in the shorting plug. Check the servo draw at idle by plugging in the meter leads. Moving the sticks shows the current draw at the highest load.

Ken Casser, Manhasset, NY



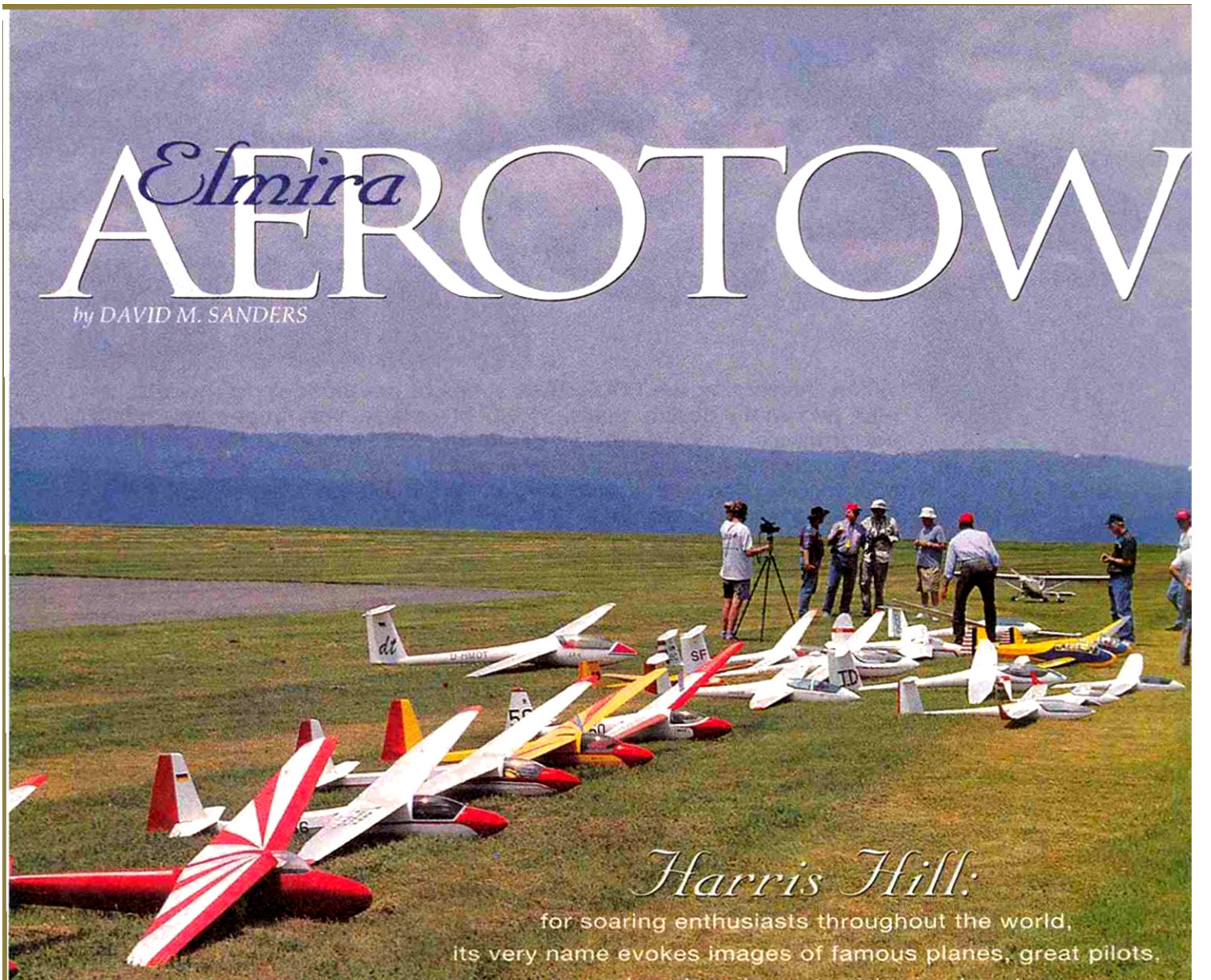
HOT BENDS

Pre-shape windshield material for easier gluing by rubber-banding it to a jar of very hot water.

Harold Wilson, Midland, TX

Elmira AEROTOW

by DAVID M. SANDERS



Harris Hill:

for soaring enthusiasts throughout the world, its very name evokes images of famous planes, great pilots, engineering pioneers and records set. What better location to host a scale R/C soaring event!

The Harris Hill glider port just outside the town of Elmira, NY, is the original home of the famous Schweizer Aircraft sailplane company, and is now the location of the National Soaring Museum. The field is still used as a full-scale glider port and is managed by the Harris Hill Soaring Corp., which graciously granted permission for the R/C event to be held again this year along with help from the local R/C soaring organization, the Harris Hill L/D Club. This year's event was very capably CD'd by John Derstine and Ernie Heyworth. Tim Farr and Roy Card provided safety inspections for all the aircraft; Jeff Koski helped to keep the flight line moving smoothly; and Ed Lokken and his staff maintained the transmitter impound. Also present as tow coordinators were Robin Lehman and Jim Blum, two of the U.S.'s premier authorities on aerotowing operations and techniques as applied to models, with help from Wayne and Dee Parrish and John Derstine. Everyone did a great job and made a Herculean effort that resulted in a very smooth-running event.

100+ R/C SCALE SAILPLANES

PHOTOS BY DAVID M. SANDERS UNLESS NOTED

'97

With its third consecutive year under its belt, Elmira Aerotow has become a magnet for scale sailplane modelers the world over to share in their special facet of R/C modeling and has become a great place to see the best and brightest in the scale soaring community show their craftsmanship and flying skill. Fifty-seven registered pilots from as far off as Germany and Canada as well as across the U.S. converged to spend three beautiful days doing what they do best: flying more than 100 fantastic, scale, R/C sailplanes.

PHOTO BY ROBIN LEHMAN

True to the event's name, all the aircraft are launched by aerotowing, meaning they are pulled into the air behind powered R/C aircraft, many of which are also impressive scale models. The illusion of scale flight is nearly perfect, and if you remove the full-scale humans from the picture, it's difficult indeed to tell whether models or life-size sailplanes are taking to the cumulus-sprinkled skies.

Weather for the event couldn't have been better; rain did threaten on Friday, but it cleared for a great afternoon of flying. Both Saturday and Sunday were partly cloudy with generous thermal lift popping from all corners of the field. Winds remained light for the entire weekend.

As well as the flying, there was the joy of camaraderie with fellow scale enthusiasts. This was brought to a real crescendo during Saturday night's banquet, which

Above: Best Modern Airframe ASW-27 went to John Derstine's model built from a Pri-Bek kit. At 1/3 scale (195-inch span), it has very good flight performance; the bigger they are, the better they fly! Shown with John Derstine and sons John and Michael.
Left: Theo Arnold's Duo Discus from EMS kit on final approach. Note the scale, three-wheel landing gear.

Above: Best Schweizer Sailplane and Best Overall went to Peter Destefano's outstanding, scratch-built Schweizer TG-2 in U.S. Army Air Force colors. Built at 1/5 scale from Model Airplane News plans, it includes complete cockpit detailing. Look at the neat trophies created by Asher Carmichael especially for the event.
Left: Best Vintage Airframe went to Pete George for his 1/5.85-scale (163-inch span) ASK-18 from the Roke kit. Paintwork on this model was exceptional.

Michael Derstine helps a 6-meter Buechele Nimbus on tow.
PHOTO BY JOHN SAHN

Pilots' Choice Awards

Best Schweizer Airframe	Peter Destefano	Schweizer TG-2 (scratch-built)
Best Vintage Airframe	Pete George	ASK-18 (Roke kit)
Best Modern Airframe	John Derstine	ASW-27 (Pri-Bek kit)
Best Overall	Peter Destefano	Schweizer TG-2 (scratch-built)
Best Pilot	Theo Arnold	EMS Duo Discus

featured guest speakers Paul Schweitzer, founder of Schweitzer Aircraft; Maynard Hill, R/C soaring pioneer and AMA Hall of Famer; Larry Fogel, scale soaring enthusiast; and Michael Schellberg from the German contingent relating European happenings in scale modeling. I found Mr. Hill's presentation in particular to be fascinating, enlightening and moving; I truly admire his grit, curiosity and total ingenuity.

Flight demonstrations were performed by Exclusiv Modellbau Scheifele (EMS) of Germany with their highly aerobatic Duo Discus piloted by Theo Arnold, and electric aerotowing was demonstrated by Etienne Dorig and Alex Wenzel of ICARE Sailplanes of Quebec. Along with these demonstrations, full-scale sailplane operations continued throughout the weekend to create an interesting mix of model and full-scale flying. Exceptionally good planning and communications between the modelers and full-scale pilots ensured the safety of both groups, and many of the modelers took rides in full-scale sailplanes.

What can I say? This was a fantastic, fun, friendly event. I'll definitely do it again. Want a tip for a good time? Well, have a plane that's large enough to be easily aerotowed off a grass strip. Robin Lehman recommends that your model have a span of at least 3 meters (about 120 inches). After my personal experience, I'd say that's probably wise. I wasn't comfortable with trying my 2.3-meter plane on aerotow off the grass, so next time, I'll definitely take a larger ship. I sure did like Doug Barry's ASK-

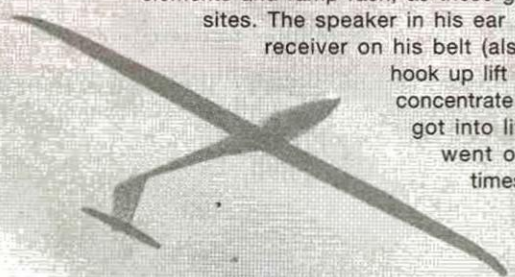
Duo Discus on base-leg turn. Scale appearance in flight was very impressive; it looked "right" in the air.

YOU WANT THRILLS?

There's lots of fun to be had with scale ships, and this was particularly well-proven with EMS factory pilot Theo Arnold's flight demonstration of their 5.33-meter Duo Discus (that's 210 inches to us Americans!). This model's large size makes it very efficient, and it can efficiently store the gobs of energy generated by a blistering 1,000-foot dive. After whistling into the pattern from nearly invisible height, Theo performed beautiful point rolls, loops, stall turns and high-speed inverted passes right over the runway. I bet any F3A flyer would have been pretty impressed.

You'll notice that Theo uses a transmitter tray to allow him to "pinch" the sticks instead of "thumb" them. In Europe, this is very common practice, and advocates say this can greatly increase control acuity (sure as heck worked for him!). The fiberglass hood on the transmitter tray protects the radio from the elements and ramp rash, as these guys are often flying at alpine sites. The speaker in his ear is wired to a thermal-sniffer receiver on his belt (also by EMS), allowing him to hook up lift quickly and easily so he can concentrate on the show. Once this bird got into lift, it specked out quickly; it went off my radar screen several times!

Today's scale sailplanes are doing a lot more than just floatin' around, friends.



An inverted pass by Theo with the Duo Discus.

Theo Arnold prepares to launch as he chats with flying buddy Ralf Scheifele. These guys and their crew came all the way from Germany to attend the event. Ralf also arranges tours for visiting fliers in Germany, and they've got some truly astounding mountain slope sites to show off.

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Scale sailplanes make truly graceful fliers. This ASH-26E cuts a nice clip as it comes around for final. Note the retractable main wheel and functional flaps and spoilers. These are full-house, no-nonsense sailplanes capable of really smooth performance and excellent, scale-like flight.

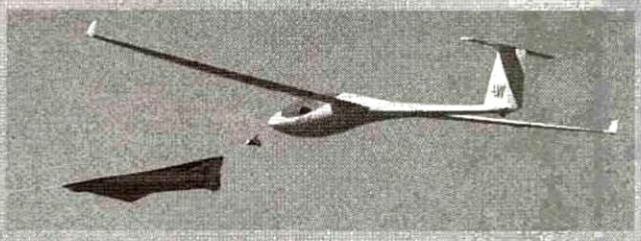
Aerotowing: a First Try

When I first saw aerotowing, I thought it looked pretty risky, but I saw it done a few more times and noted that very few accidents occurred. Today, it's acknowledged that aerotowing is the safest way to launch big, scale sailplanes from flat fields with a minimum of abuse to their high aspect ratio wings.

I tried aerotowing at the event with the help of Douglas Barry and his ¼-scale ASK-18 built from Cliff Charlesworth plans. Construction of this plane was very straightforward and would be no trouble at all for a moderately experienced balsa cutter. Heck, you don't even need an engine! Doug provided me with a short briefing, and off I went.

Both the sailplane and the towplane have a towline-release mechanism that can be actuated by an independent switch on their transmitters. The towline is more than just a piece of string, too. It's a Dacron line with a 24-inch length of shock chord (like a regular bungee chord) at its middle and a long red flag at the sailplane end. The bungee reduces sudden shock loads, and the long flag gives the sailplane pilot a visual cue for maintaining optimum line tension during the tow. The towplane's hook mechanism is on the top of the fuselage at about the wing's trailing edge—not on its tail. The sailplanes usually have hook mechanisms at the nose, or on the bottom of the fuselage close to the nose (well ahead of a winch or high-start hook). This allows a smooth, flat climb-out behind and a little above the towplane.

On the takeoff roll, I found my main requirement as towee was to keep the wings of the sailplane level as both aircraft picked up flying speed. The model quickly left the ground



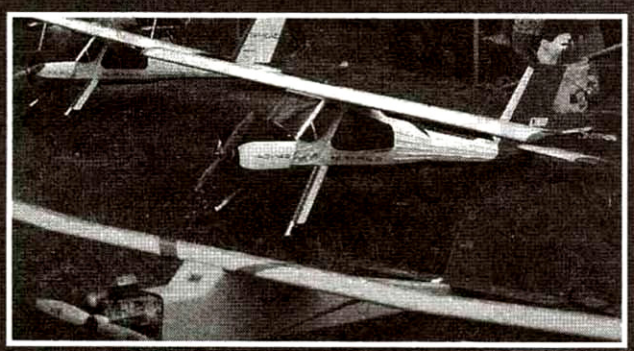
The long flag on the towline helps the sailplane pilot to modulate the right elevator trim for good towline tension. Many flyers actually set elevator trim on their transmitter just for launch in the same manner as a full-scale pilot would. This ASW-27 is demonstrating good form.

and was in flight and, a couple of seconds later, so was the towplane. Once in the air, it was a simple matter of keeping slight backpressure on the elevator to maintain solid line tension and making slight yaw corrections with the rudder. The plane was perfectly capable of damping any air-induced oscillations on its own, and I'd seen on previous occasions that chasing a "funny" was a ... uh ... bad idea.

Shortly, with both planes at the limit of my vision, I simply said to the tow pilot, "cuttin' loose." I toggled my tow release, dropped the nose slightly, and settled into max L/D mode while the towplane veered back to the ground to pick up the next sailplane.

All in all, this was a gentle process and put very low stress on the ASK's wood structure. The plane handled very nicely in the air and was very much akin in feel to the venerable Oly' II and much less touchy than my 90-inch Salto slope rocket. There's a vintage model in my future!

PHOTO BY ROBIN LEHMAN



Here's an unusual one! This ¼-scale (109-inch span) PZL-104 Wilga 35 (Frisch kit) is available through Sailplanes Unlimited Ltd.*; Zenoah G-62 power.

THE WORKHORSES OF AEROTOWING

There's a warm home for the crossover flyer in aerotowing. The towplanes are often specially built for the task, and their pilots are almost always seasoned scale sailplane flyers who demonstrate great skill in both powered and unpowered flight. Some of the towplanes are beautiful scale models in their own right.

Modifications to these models include strengthened landing gear and large wheels for use on the grass fields commonly used for aerotowing. In addition, they're often outfitted with larger than stock engines as well as high-capacity fuel tanks to provide adequate power to haul the sailplanes.

18, which he scratch-built from Cliff Charlesworth plans. I could build one for comparatively little money and end up with a great looking and flying sailplane that's ideal for aerotowing. On the other hand, if you've got the money, flying skill and inclination, you can get a superbly crafted modern plane that's almost "plug and play" and will put you in the big leagues right away. Most of the mid- to high-level thermal duration/competition flyers I talked with told me they felt comfortable with the sleek, modern ships right away. There are so many shades of gray between these two ends of the spectrum that there's no reason scale soaring shouldn't attract an even wider following. I'm hooked.

To find out more about next year's schedule of events, contact John Derstine at (717) 596-2392 or by email at **johnders@postoffice.ptd.net**. You can also see John's website at **www.geocities.com/CapeCanaveral/Lab/5739** to take a look at some of the neat stuff he has collected from around the world.

**Addresses are listed alphabetically in the Index of manufacturers on page 126.*

Del Runkle of Latham, NY, scratch-built this good-looking Boeing F4B-2. The 1/5-scale biplane is built from John Tanzer plans and has a wingspan of 69 inches. Power comes from a Zenoah G-23 gas engine.

10th Annual MINIATURE WARBIRDS FESTIVAL

by GERRY YARRISH

It all started as a simple idea between two friends. The year was 1987 and the idea was a first. Today, IMAA giant-scale, all-warbird gatherings are practically everywhere and continue to be very popular events. But 10 years ago, giant warbirds—especially the WW II variety—were spread pretty thin. When Roy Vaillancourt and Fred Thumm thought up Miniature Warbirds Ltd., they brought together some of the most impressive heavy-metal warbirds then flying. For the first time, an annual event catering to the WW II giant-scale modeler was on the calendar. Celebrating its 10th birthday, the 1997 Miniature Warbirds bash was something special indeed.

Leaving a smoky signature behind, Ray Labonte's Harvard comes in for a high-speed pass. The 101-inch model is powered by a 4.2 engine.

PHOTOS BY LARRY MARSHALL & GERRY YARRISH

Checking the front for enemy action, a pair of 1/4-scale Cubs patrols the area.

World War II comes to Schenectady

The first base of operations for the Miniature Warbirds Festival was Binghamton, NY, and it was hosted by the Binghamton Aero Modelers. The Warbirds Festival then traveled up and down the East Coast, hosted by various clubs, until 1993, when it found a permanent home. Now based in Scotia, NY, at the Schenectady municipal airport, the Miniature Warbirds work closely with the Empire State Aeroscience Museum, which is also based at the airport.

THE MISSION

The theme for the Festival is strictly WW II vintage. Any military aircraft of any nationality is welcome as long as it is painted in wartime markings. This includes bombers, fighters, observation aircraft, transports and trainers and anything else used in military service between the years of 1935 and 1950. Civilian aircraft are not on the menu.

Bill Steffes brings his Ziroli AT-6 Texan in after a successful flight. Bill has been flying this Texan for many years.

THE MOOD

One of the nice things about the event is that the WW II theme is spread throughout the entire weekend. Big-band music from artists such as the Andrews Sisters and Benny Goodman was tops on the hit parade, and period music is heard throughout the day over the PA system. Many of the longtime "lifers" at the meet come dressed up in period attire and show off their "spit and polish" boots, pilot's

Paul Byrum of Greenville SC, scratch-built this unusual Fiat G-55 Centauro. Powered by a Walker 3.2 engine, the 86-inch-span model also has retractable landing gear.

wings and officer's brass. The best I could muster would be some NCO stripes. Olive drab and khaki are definitely the preferred colors, but you don't have to dress up if you don't want to; it's all in good fun.

This year, the weather couldn't have been better for flying. On Friday and Saturday, a high overcast kept the temps down while hardly a breath of wind could be felt. Sunday brought blue skies and bright sun, though the wind did pick up a bit. Having the sod runway situated so closely to an active airport, the Miniature Warbirds staff and safety personnel remain in constant contact with the airport's tower. There were flagmen at the outer edges of the huge grass flying field to warn pilots if they strayed too closely to the outer boundaries. With 160 aircraft, the pits were just filled with military eye candy, and pilots came from as far away as Canada, Ohio and South Carolina.

Bob Poston came up from South Carolina to fly his Byron T-6.

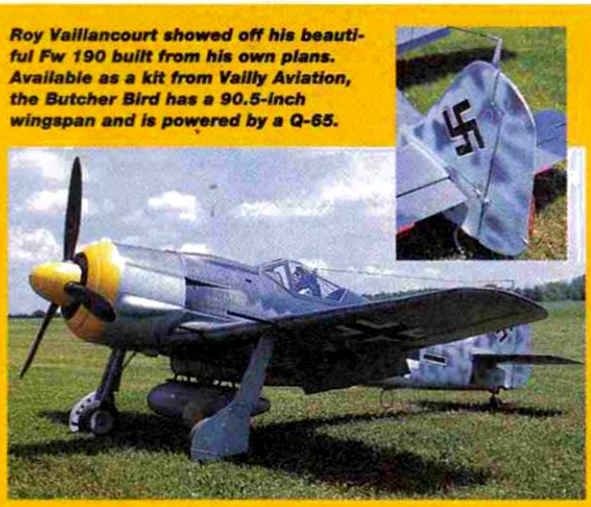
The latest effort of Bill Steffes, this beautiful Grumman Hellcat was completely rebuilt after a crash last year. Everything from the horizontal stabilizer forward was replaced. The new model is 6 pounds lighter than the first version.

This 62-inch-span Bucker Jungmeister is the work of Bob Curry of Woodstock, NY. The German bipe is powered by a .90 4-stroke and weighs 11 pounds.

THE PEOPLE

Many people are responsible for this event's success, including CD Ron Chizek who along with Mac Smith and Sal Savarese, kept the flightline running smoothly. Each year, Jeannie Thumm cheerfully runs the registration (Induction Center) tent and this year, Jeannie headed up the hangar decorating committee for

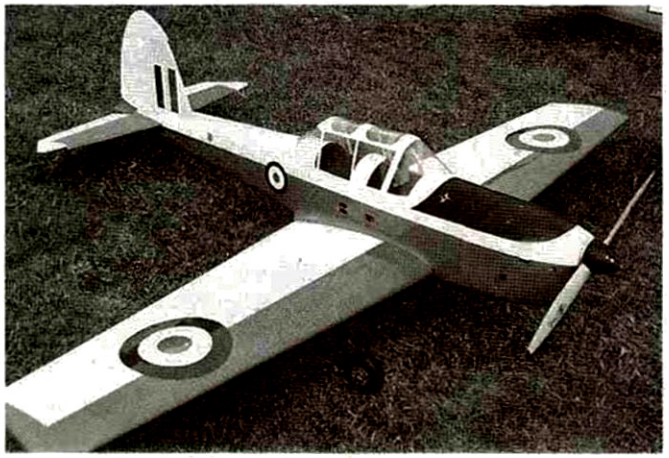
Roy Vaillancourt showed off his beautiful Fw 190 built from his own plans. Available as a kit from Vailly Aviation, the Butcher Bird has a 90.5-inch wingspan and is powered by a Q-65.



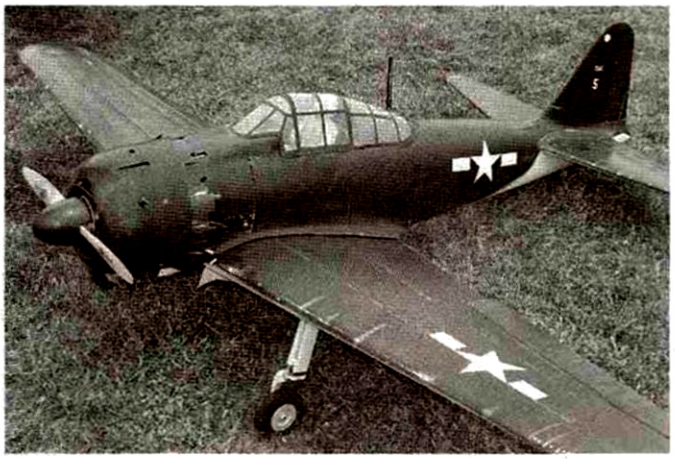
the Saturday night USO-style dinner/dance. Hilda Smith, Donna Chizek and Nancy Vaillancourt were also in uniform and kept charge of the "PX" (T-shirts, coffee mugs, souvenirs and raffle tickets). Bob and Linda Kaliski along with Sandy and Doug Ives ran the "radio room" (impound) while up in the control tower, Kenny Wilson and Fred Thumm kept everyone informed. Dan Whiteman also plays an important role each year as he is the coordinator between the event and the Empire State Aeroscience Museum.

During the Saturday-night USO-style dinner/dance, Roy Vaillancourt (left) and Jeannie and Fred Thumm enjoy a well-deserved meal. Roy and Fred are the founding fathers of Miniature Warbirds Ltd.

The museum and the Miniature Warbirds Ltd. work very well together and both benefit from the partnership. The Museum makes available the great 80x800-foot flying site, while all the proceeds from the festival go to the Museum fund. The Museum's restoration program rebuilds historical aircraft, and the annual



A perfect trainer for warbird fly-ins—the venerable de Havilland DHC-1 Chipmunk. Dick Allen built this one from the Ohio R/C kit and powered it with a BGX-1.



Built by Ron Gagner, this Japanese Zero built from a Yellow Aircraft kit is powered by a Moki 1.8. The paint scheme is from a Zero that was captured in Saipan between 1942 and '43 and was used in the U.S. for testing.

EMPIRE STATE AEROSCIENCE MUSEUM

A short distance from the Warbirds' flightline is a wonderful collection of aviation artifacts. The Empire State Aeroscience Museum also has an active restoration facility on its grounds where volunteers rebuild historical aircraft. If you combine a tour of the Museum with the Miniature Warbirds fly-in, you have a combination that is unique and well worth the trip to Scotia, NY.

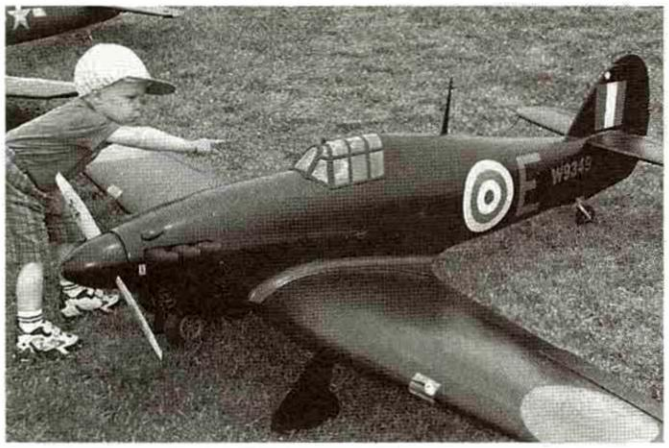
The museum is right next to the Schenectady municipal airport and a taxiway connects it to the active runway. The Museum is housed in what was once a

The Museum has expanded until now it includes the main test hangar that was once used by the old General Electric test facility. The Warbird's USO-style dinner/dance was held in this hangar Saturday night.

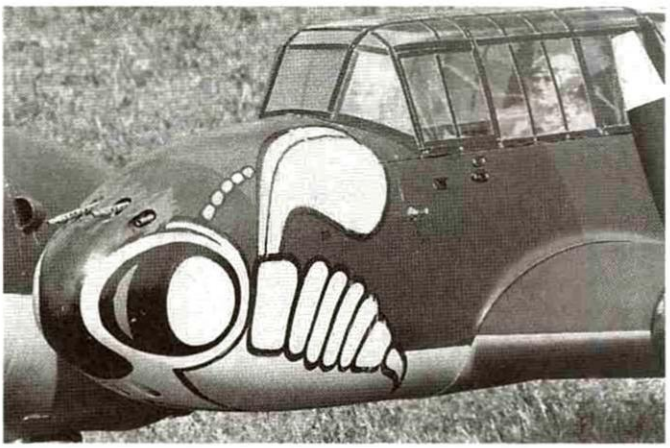
Almost in airworthy condition, the Museum's B-25 Mitchell bomber was on display.

General Electric test facility. During WW II, GE tested the first successful jet engines at this site and later went on to develop such jet engines as the J-47, J-73 and J-79. Other systems, such as the superchargers used on B-17 Flying Fortresses and fire-control system for Boeing B-29s, were also developed at this GE facility.

The U.S. government also tested the first ideas of "stealth technology" at the facility by reducing the amount of metal used on airframes, thus reducing their radar signatures. The first such aircraft to be tested was the Lockheed Gamma racer which had its metal fuel tanks replaced with ones made of fiberglass.



I want one of those when I grow up!

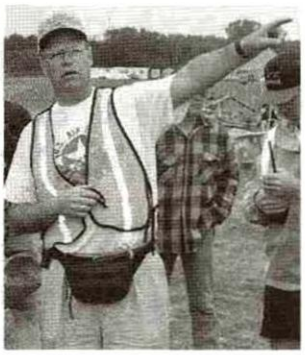


Now, here's a killer Bee—the nose art on Mac Smith's impressive Me 110; 135-inch wingspan; 54 pounds; two Zenoah G-45s for power.

model meet helps keep this effort going.

On the flightline, most of the major WW II powers were represented. Italian, German and Japanese aircraft were in attendance for all the Allied aircraft to chase. Twin-engine transports ferried cargo, and multi-engine bombers carried their imaginary bomb loads to distant targets. Fighter-escort sorties took off every few minutes, and impromptu dogfights were the norm. I find it difficult to believe that anyone attending the Miniature Warbirds Festival would not come away from it with at least some stirred emotions. From nostalgic feelings of patriotism to just feeling good about giant-scale flying, the Miniature Warbirds Festival sets the stage for a weekend well worth your consideration.

For more information on the Miniature Warbirds Ltd., contact Roy Vaillancourt, 18 Oakdale Ave., Farmingville, NY 11738-2828; (516) 732-4715.



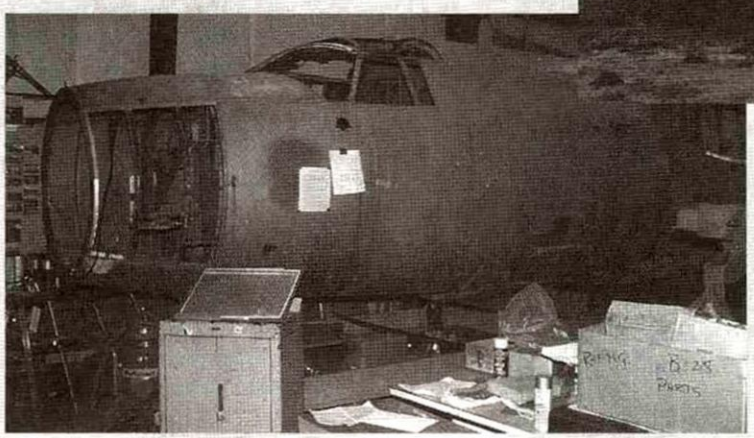
The coordinator between the Miniature Warbirds and the Empire State Aeroscience Museum, Dan Whiteman, helps direct the flightline.

On display are many aircraft and aviation artifacts. Inside are dioramas of significant aviation events, mock-ups of antique aircraft and control systems, a replica of the interior of Amelia Earhart's Lockheed Electra and the 28-foot-long miniature of a Japanese aircraft carrier used in the motion picture "Tora, Tora, Tora."

Outside, there's a B-25 Mitchell, a Douglas C-47, a MiG 17, an F-101, an F-105, an A-4 and an F-4 Phantom to name just a few of the display aircraft. Of particular note is the Museum's newest acquisition, an A-6 Intruder. This aircraft—almost complete, but without its engine—was saved from a bargeload of similar aircraft the U.S. Navy dumped into the ocean to produce artificial reefs! The reef's loss is the Museum's gain.

If you attend one of the Miniature Warbirds fly-ins, drop by the Museum and donate a dollar or two to help save an airplane.

In the restoration shop is the forward fuselage section of a Martin B-26. This great bomber is slowly being restored by the many volunteers.

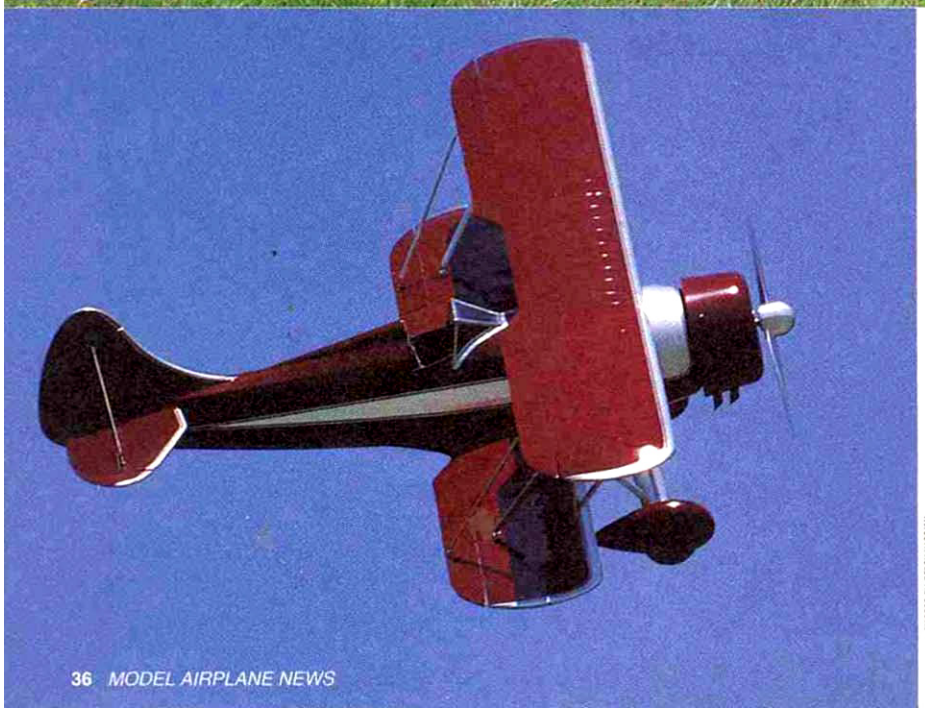


The newest acquisition for the Museum—an A-6 Intruder from the U.S. Navy.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

BYRON ORIGINALS WACO UPF

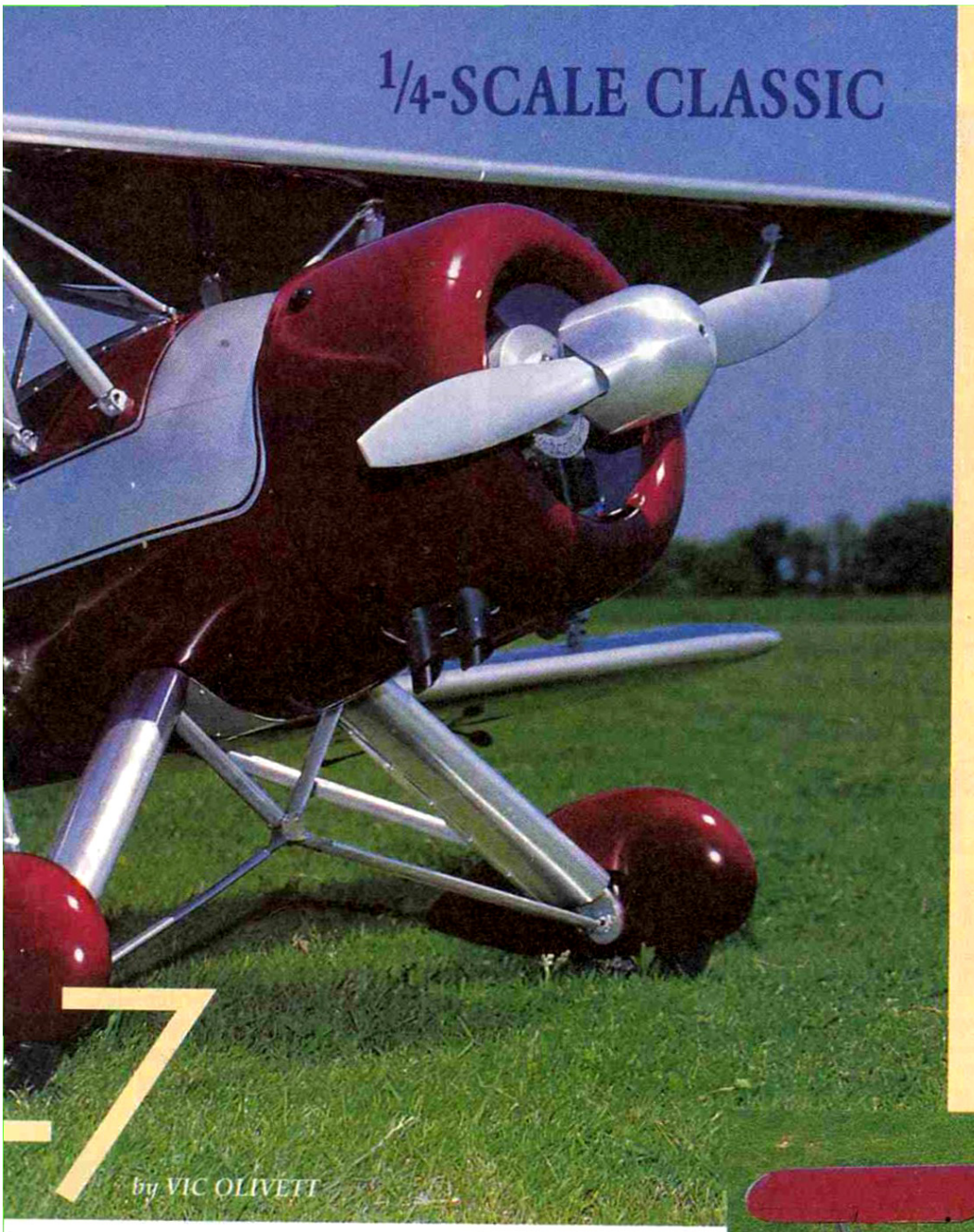


PHOTOS BY GERRY YARRISH

THE WACO UPF-7 was a great primary trainer that was used to train thousands of pilots during WW II. Though often mistaken for a Stearman, the WACO is a smaller plane with a wider main gear. While in Florida this past winter, I saw two new WACOs fly over the beach; you can always tell the sound of a radial overhead! New WACOs are still being built in the Midwest; I guess you can't get enough of a good thing.

Byron Originals'* 1/4-scale WACO UPF-7 kit features injected-molded foam wings and a hand-laid, fiberglass fuselage with all panel lines molded in. It comes with formed steel-wire cabane and N-struts; formed aluminum gear struts; and tires, axles and a steerable tail-wheel. A fiberglass cowl and wheel pants, dummy 7-cylinder radial engine kit and flexible flying wire kit are also available as options.

1/4-SCALE CLASSIC



SPECIFICATIONS

Name: Waco UPF-7

Manufacturer: Byron Originals

Type: scale biplane

Wingspan: 88 in.

Weight: 26 to 28 lb. (as flown, 27¼ lb.)

Length: 69 in.

Radio: 4 channels, 6 servos

Engine: Zenoah G-62 or equivalent

Engine used: Mustang 50

List price: $1,059 (kit); $67.40 (cowl); $87.55 (wheel pants).

Features: injected-molded foam wings and a hand-laid fiberglass fuselage with all panel lines molded in. It comes with formed steel-wire cabane and N-struts; formed aluminum gear struts; and tires, axles and a steerable tailwheel. A fiberglass cowl and wheel pants, dummy 7-cylinder radial engine kit and flexible flying wire kit are also available as options.

Comments: I spent a lot of time building the Byron Waco, and it's a beautiful model. Its flight characteristics are very realistic and gentle.

Hits
- Complete kit.
- Very well-done instruction manual.
- Good-quality hardware.

Misses
- Problems with fiberglass parts.

-7

by VIC OLIVETT

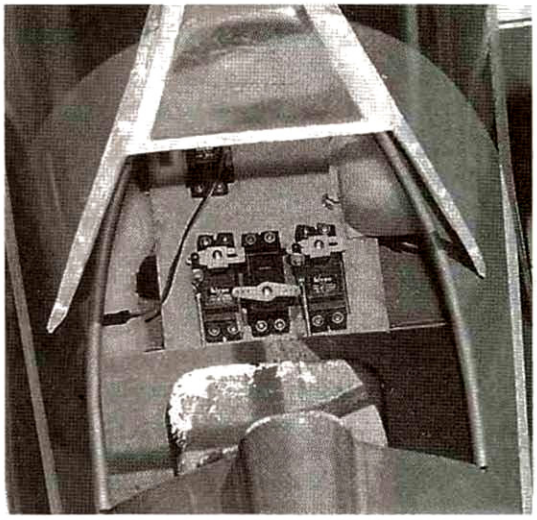
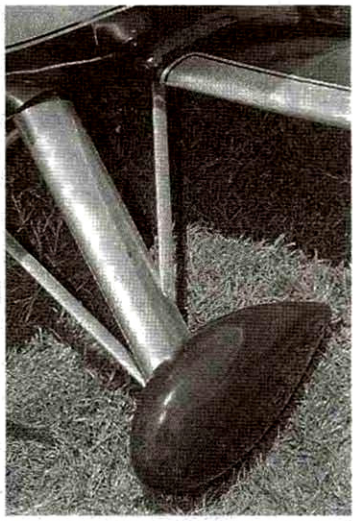
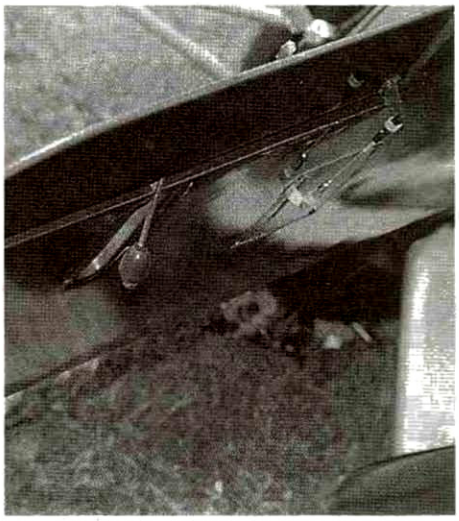
THE KIT

The kit comes in two large boxes. All the part bags are numbered for easy identification, and the kit includes just about everything you'll need. The instruction manual is very well done, with each step well explained. The photos are clear and very helpful. One very important step before any construction is to sand all fiberglass gluing surfaces with 80-grit sandpaper and clean them thoroughly with white vinegar. While doing so, I found several imperfections in the fuselage: the seams weren't bonded correctly and were very weak. Byron sent me a new fuselage and has since corrected this in its kits.

FUSELAGE

Construction of the fuselage is not easy, and a second pair of hands will come in handy. Use a hot-glue gun to tack the formers into place and polyester resin to glass in the formers. Trial-fit all the parts in each step before glassing them in place (this is where the hot-glue gun comes in handy). Since the alignment of all the formers is so critical, they should be double-checked. After installing the blind nuts, I used a drop of thin Zap* to secure them in place. The F-1, F-2 and F-3 formers are all tied in together and support the landing gear and the cabane struts. Again, this is why the alignment is very important. Maple rails add support to the area.

The foam stabs are supported by an ⅛-inch plywood spar and a ¼-inch aluminum spar tube. Setup is critical, so take extra time. The elevators are also made of foam and have to be glassed. The hinges are epoxied into the stab, elevators and rudder foam parts. The rudder post is reinforced with ¼-inch balsa. I glassed the rudder post

Left: viewed through the rear cockpit opening, the servos and fuel tank are easy to see. There is plenty of room for everything. Center: the landing gear is scale and functional. Aluminum skins are used to cover the gear and greatly enhance the model's finished appearance. Right: the ailerons are counter-balanced with weights, as shown here. Note the aileron servo hatch in the bottom of the wing.

in with polyester resin and cloth.

Installing the landing gear is difficult, but it's a work of art when completed. I used medium Zap to fasten the ply formers to the aluminum landing gear. Take great care when forming the fairings around the formers on the landing gear. The center section of the landing gear is for show but has sliding parts that should be lubricated to prevent them from binding, which could cause them to bend out of shape on takeoff and landing.

The horizontal stab, elevators and rudder are all made of injected foam and must be glassed, primed and painted. The foam parts must be very carefully sanded to retain the molded-in ribs. Z-Poxy finishing resin works very well for this procedure. It sands well and gives a great finish. All these parts have dowels installed to support the flying wires.

A word of caution: check the inside of the fuselage, back by the vertical fin. I found split seams on both the first and second fuselages. Reinforcing tape worked well, but the joint opened up when slight pressure was applied to the sides. I repaired this by forcing the joint open and applying a liberal amount of resin with a small brush. Release pressure and wipe off the excess resin with a paper towel.

FLIGHT PERFORMANCE

• Takeoff and landing

The first high-speed run down the runway showed that the rudder plays a very important role with this airplane. The WACO wants to pull to the left. Once power was applied, I had to feed in full right rudder and hold it until after liftoff. When the WACO reaches flying speed, the rudder can be relaxed. The WACO lands much like any other giant-scale model; just remember to keep the power on until you're ready for touchdown. The WACO settles in very nicely, and rollout is straightforward.

• Low-speed flight

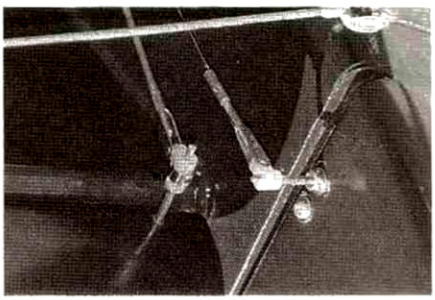
I was very nervous about pulling power back on the WACO, but with those big wings, it slows down quite well. At about ⅓ throttle, the WACO loses very little altitude, but turns are very shallow. The WACO stalls quickly and drops its nose fast. Just add full power and slight up-elevator, and it recovers nicely. Remember to give the model plenty of room for a clean recovery.

• High-speed flight

When the WACO is up on step and at full power, it cruises along very nicely and looks as if it could be full-size. The controls are very positive and smooth. Although high speed is not very fast, the airplane flies very well at full power, and you can relax and enjoy looking at this realistic model. Remember, the WACO is a big airplane with a lot of drag; it wasn't designed to be fast.

• Aerobatics

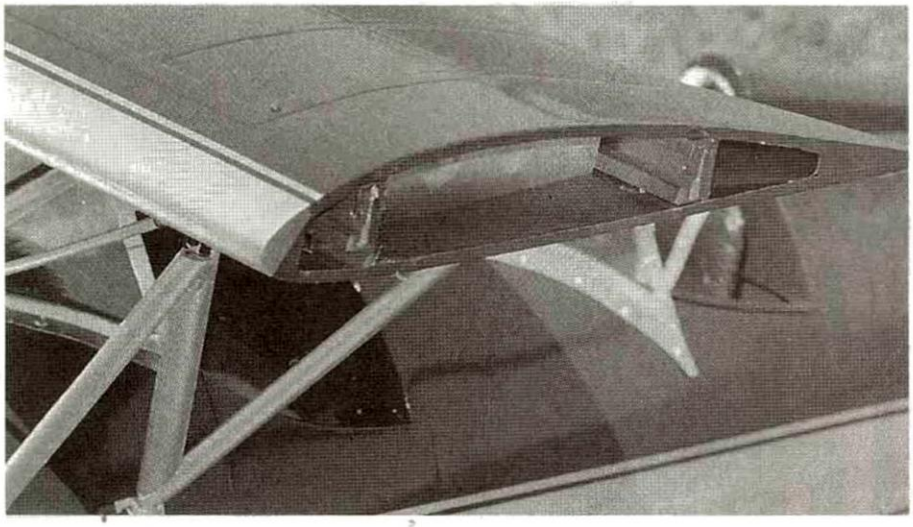
This airplane isn't a hotrod. All aerobatics are performed much as they are with the full-size WACO, meaning that a slight nose-down attitude is needed to build up speed. Loops are big and beautiful, and rolls are slow and clean and lose very little altitude. The best maneuver of all is a big old barrel roll. At full power and with speed built up, the model looks and sounds like the real thing. After climbing to 500 or 600 feet and pulling the power back, the WACO enters a very nice, clean spin. The spin is slow and altitude is lost very quickly, but recovery is easy. Overall, I have to say that this model flies like a full-size WACO.

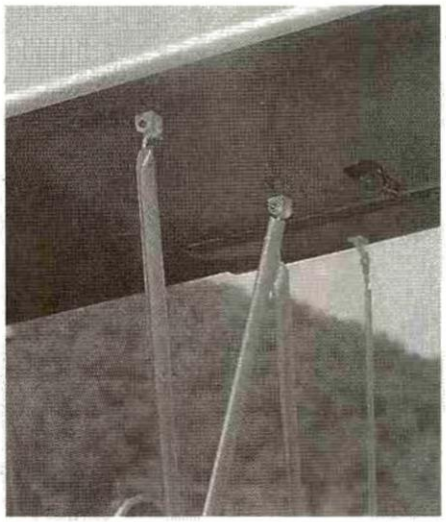


The control linkage for the WACO's tail is straightforward and uncomplicated. Threaded rods are used for the horns. The rubber is set up with pull/pull cables.

WINGS

The wing panels are injected-molded foam with simulated ribs. When sanding, be very careful not to remove the rib lines. Each wing panel has two aluminum spars. The 1/16-inch root caps are epoxied on with 30-minute Z-Poxy and are glassed. The servo-wire channels are covered with 1/16-





Left: the top wing center section is also made of fiberglass and houses aluminum channels used for wing panel attachment. Right: the outer wing panels are supported by the N-struts. They attach easily with 4-40 cap-head screws. A very rigid setup.

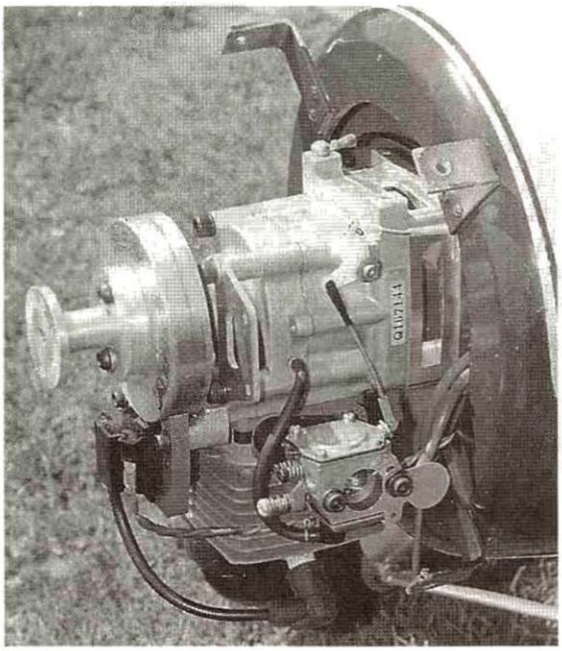
inch balsa, and covers are supplied for the servos to be mounted on the side. The counter-balance assembly did need some extra support. I used a piece of ¼-inch dowel in the ailerons and then tapped them for the counter-balance shafts. The ⅛-inch ply blind nut retainers are used for the N-struts. The 4-40 blind nuts placed on the backside of the ply circles are glued into the wing with Z-Poxy. A little piece of Scotch tape will protect the blind-nut threads.

After all the panels were completed, I glassed the wings with Z-Poxy finishing resin and glass cloth. This is the time to ask a friend for some help. The valley between the ribs is a little tough to handle by yourself.

The center section of the top wing is glass and has great detail. I found that slight pressure on the top and bottom of the wing caused the rear seam to open. Again, polyester resin worked well for this repair. The two spars are glassed in, with the aluminum extrusions bolted and epoxied in. Alignment is very important. You'll also have to install the hardwood blocks for the cabane cross-brace anchors.

RADIO AND ENGINE

I've used Hitec* gear for the past two years, and I could not trust this project to anything other than a Prism 7. Its reliability has been exceptional. The servos in the wings are 615MGs. They have more than enough power to drive the four ailerons. I used two more 615MGs for the elevators. Byron suggests using one servo and two pushrods joined near the servo, but I felt much safer using two separate servos. I decided to use a pull/pull system on the rudder, rather than one pushrod. A standard 422 was used for the throttle. A 1700mA, 6V battery was used to power the system.



The Byron Mustang 50 gasoline engine is a good choice for the WACO; with the optional spring starter, it starts easily.

For power, I used a Mustang* 50 with a Zinger 22x6-10 prop painted with silver Krylon and then balanced. The mount with the kit was set up for a G-62 and had to be modified for the Mustang. I used a 4-inch-square, ¼-inch-thick aluminum plate that had been drilled and tapped. A J'Tec* muffler fits well inside the cowl.

FINISHING

All the glass parts were washed down with white vinegar and then sanded. The small pinholes were filled with Hobbico* Hobbylite filler and sanded again. After several coats of primer and sanding, my friend Rich Trembacz painted the model. I tried a new product for the first time—Fine Line tape from Great Planes*. You apply the tape, paint over it, then remove the tape for a sharp, clean pinstripe. A little cockpit detail and some wax, and we were ready to go to the field.

AT THE FIELD

With 24 ounces of fuel on board, the WACO weighed in at 27.25 pounds. After range-testing the Prism, it was time to go. The Mustang 50 is an extremely easy starting engine. The idle was excellent at 1,600rpm, and it transitioned very well up to 6,300rpm with a 22x6-10 prop. The first high-speed run was a little hairy; the WACO wanted to pull hard to the left. On the second try, I held in full right rudder as I increased the throttle, and this made for a smooth, tail-up takeoff. As the speed increased, the WACO was at home in the air. A click of up trim and two clicks of right, and things were as smooth as could be. After three times around the pattern, I brought the throttle back to about one third, and the WACO settled in for a 3-point touchdown.

The average modeler will spend a good six months building the Byron Originals WACO UPF-7, and he or she will end up with a great-looking model that has very realistic, gentle flight characteristics.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.* ✚

scoping out

Slope Sites

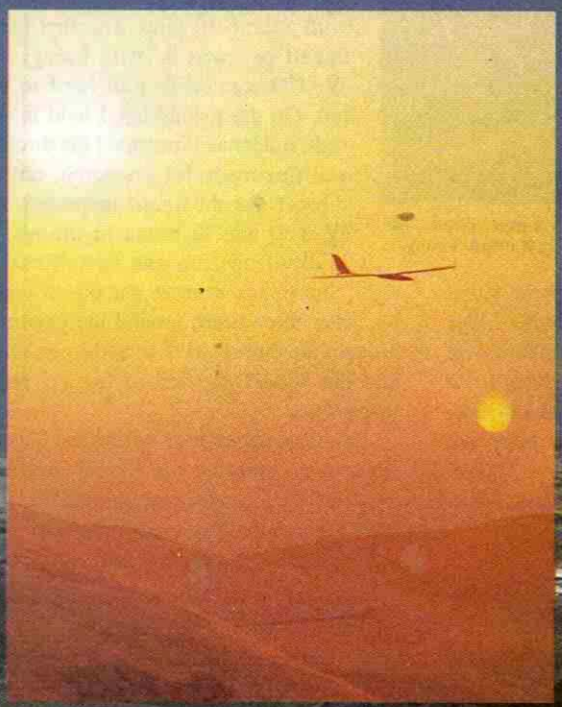
Where and how to find them

by DAVE GARWOOD

SLOPE SOARERS ARE SEARCHERS. They peer incessantly out the window when traveling by car, scrutinize topographic maps to find hills that aren't visible from the main roads and ask their outdoorsman friends where flyable hills might be.

The perfect slope-soaring hill would be 100 feet high, 500 feet long, rise at a 45-degree angle from the valley floor and be covered with grass (cut by somebody else, of course). Devoid of trees and bushes, it would run arrow straight, perpendicular to the prevailing wind direction, and have a paved road to the top with a sign reading, "R/C sailplane flyers welcome." And, ideally, it would be 15 minutes from your house.

That mythical hill hasn't yet been found, but there are plenty of hills that have enough of these characteristics to be quite flyable. The important properties are described in the following section.



Background: Rocky Mountain mega site. Art Boysen's ASW-27 over the Great Salt Lake. Flown from Francis Peak in Salt Lake City, UT. Left: western inland site; no trees. Fred Mallett's Epsilon flies at sunset from the side of the highway between Visalia and Los Angeles.

You've heard, "There aren't any hills around here." Please put aside this concern until you've finished this article. Try to be open to the fact that there are myriad possibilities for flyable sites on landfills, flood-control dams, gravel pits, strip mines, dikes, levies and ramps built for highway overpasses. Are there any states that don't have landfills, highway cloverleaves or gravel mines?

I've flown from garbage dumps and highway overpasses in four states. Simply by staring out the car window, I found a soarable inland site in Elmira, NY, that had been overlooked by members of the Harris Hill L/D Club. Although it wasn't a great site, it was soarable.

I found a soarable coastal site that the DownEast Soaring club in Portland, ME, hadn't discovered when I got lost trying to find one of their five known slope sites. Again, it's not a training site, but we flew there for three hours in November during the New England R/C Soaring Convention.

Oh, you live in the Great Plains, and it's flat there? Born in Ohio, I know that Buckeyes fly at strip mines and dam sites. On my way to the Russell County, KS, slope race, I saw more flyable slope sites within walking distance of I-70 between Topeka and Abilene than I've found in five years of searching in New York State and New England. When I got to the Lake Wilson reservoir, I had the privilege of flying with slope pilots who had flown that site for 20 years.

SLOPE SITE CHARACTERISTICS

Let's review the ingredients of good slope-soaring hills, and then we'll talk about how to find them.

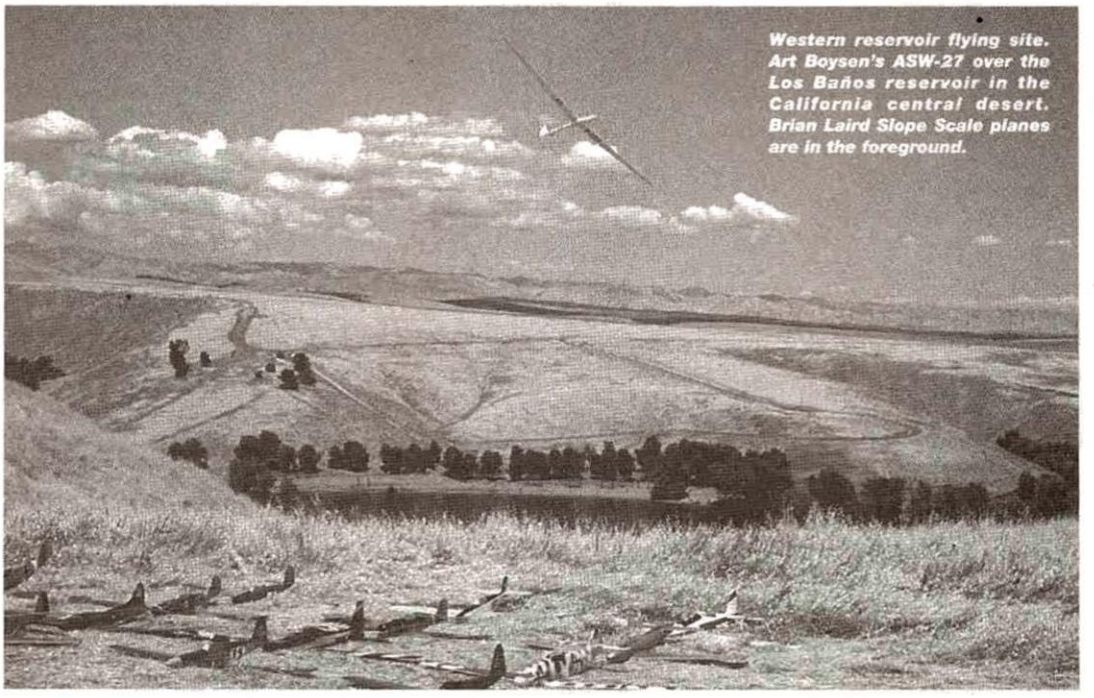
• **Height.** The practical minimum should be high enough to generate lift, and that may be as little as a 30-foot-high, abandoned highway overpass. The maximum is limited only by your ability to get to the top. The launch site at Mt. Greylock, MA, is 1,400 feet above the valley floor and, luckily, Notch Road leads to the top.

The 100x500-foot hill was suggested because it was likely to produce sufficient lift to fly in a variety of wind speeds, and it was long enough to fly straight for a while before having to turn around and come back. There are usually more small flyable hills around than large hills.

Eastern inland site; lots of trees. Dave Sanders flies a Bob Martin Coyote over a forested valley partly cleared for agriculture in Elmira, NY.

Steepness. Generally, the steeper the better, but a true cliff isn't needed. Many hours of productive slope lift can be found on hills with only a 20- to 30-percent slope. One advantage of gentler hills is that they're easier to walk up and down. You must actually fly a hill to find if it's flyable or not. Bring a hand-launcher or EPP-foam bouncer for this exploratory task.

• **Shape.** Not many hills are ruler-straight. As viewed from above, a concave ridge line collects and concentrates the wind, increasing the lift. Concave ridge lines, or bowl-shaped hills, are more sensitive to ideal wind direction, but they concentrate the wind and multiply the lift when they're "working." Convex hills, on the other hand, dissipate wind and reduce lift but are less sensitive to wind direction. You'll probably have more flyable days on a straight ridge line.



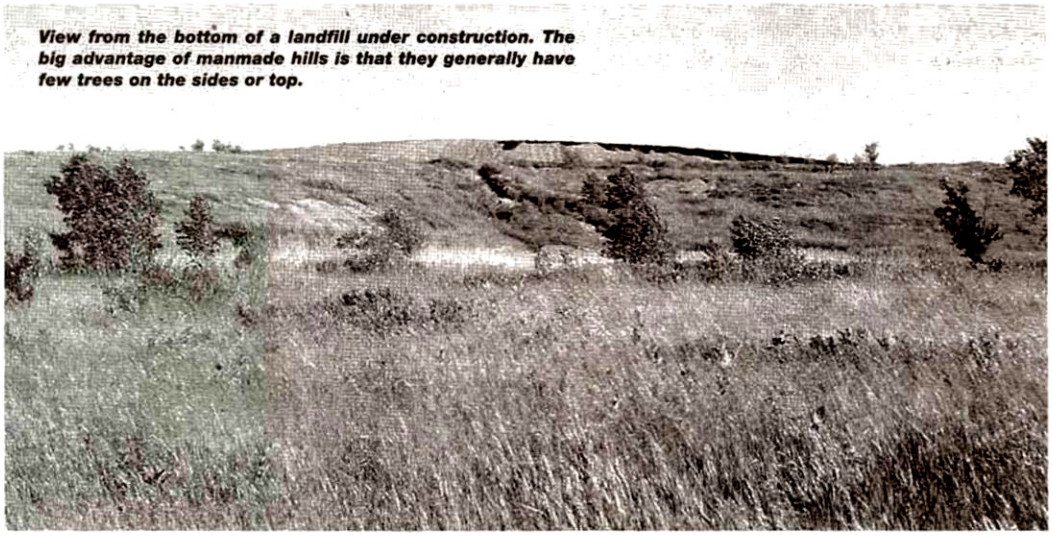
Western reservoir flying site. Art Boysen's ASW-27 over the Los Baños reservoir in the California central desert. Brian Laird Slope Scale planes are in the foreground.

PHOTOS BY DAVE GARWOOD

• **Ground cover.** Grass is great for walking, landing and finding lost airplanes. Bushes reduce the number of places you can land, and trees interfere with both landing and flying. Cleared land is preferable.

• **Upwind turbulence makers.** What's out in front of the hill is as important as the shape

and size of the hill itself. If trees, buildings and other hills are upwind of your hill, the turbulence they produce will disturb the lift at the hill. Upwind obstructions don't automatically make a hill "unflyable," they just make it more turbulent. Some well-known slope sites are on the coast, and this helps because they're free of upwind obstructions, but hills with unobstructed upwind terrain also exist at inland flying locations.



View from the bottom of a landfill under construction. The big advantage of manmade hills is that they generally have few trees on the sides or top.

• **Access and landowner permission.** You've got to get to the top to launch and be there legally to fly. Sometimes, government-owned land is allocated for recreational purposes, but it may come with restrictions. Keep your site accessible; get permission to fly and follow the rules. Often, the land is privately owned and may be cultivated for crop production. You can, however, get approval to fly on farmland by talking to the landowner in advance. Some sites are flyable for years by working around crop schedules and respecting livestock. Don't trespass; ask first.

FINDING THE SITES

Start with local contacts: ask at hobby shops and club meetings. Ask not only flying buddies but also hunters and fishermen. If you're the traveling type, go to slope-soaring events. Attend a Torrey Pines Gulls slope race or scale event. Fly Point of the Mountain at Soar Utah, the Los Baños reservoir at the Los Baños scale fly-in, or Eagle Butte at the Washington Slope Jamboree. Race on the banks of the St. Lawrence River during the Quebec slope race, or soar with the "flatlanders" at the Sig/LASS slope race in Kansas.

Online resources are coming of age. Many slope sites are identified on the R/C Soaring Exchange that's sponsored by Air Age Publishing. Join this email remailer service by sending email with the word "subscribe" in the subject line to **soaring-request@airage.com.**

Soaring club websites may list, rate and give directions to local and regional slope sites. An example is the Portland Area Sailplane Society website at **http://www.europa.com/~patch/passinfo.html.** You can find other club websites on Manny Tau's Soaring Yellow Pages website at **http://www.ocpapsych.com/yellow/ht.**

If you can find what you need through these resources, fine; but this may not be quite enough. You may live in an area that's not covered by a club, or you may want to find additional sites so you can fly in more wind directions. In this case, you'll have to emulate Lewis and Clark: get out and cover some territory and eyeball some terrain.

TOOLS OF THE TRADE

Essential equipment for finding new sites by exploration includes a compass, a notebook and maps.

A compass gives an accurate indication of the direction the hill faces and the wind direction needed to fly the site. Stand on the hill in the position you may be flying

Coastal hill; excellent height of about 70 feet, and good shape and steepness. Rudy Coletti flies Bob Sliff Sensoar at Cape Cod, MA.

A 400-foot Hudson Valley hill cleared for agricultural use. Sometimes, on large hills, we launch with a high-start and fly in combination of slope and thermal lift.

from, point the compass into the ideal wind direction and take a reading. I use a $9 compass I bought at an Army-Navy store; it came with instructions.

Record the characteristics of the sites you've found. In addition to estimated height, best wind direction and comments about steepness and availability of landing zones, you may find it useful to record instructions for getting to the site and clues for finding the landowner whose permission you'll need to fly the site.

Maps are the key to locating promising sites that aren't visible during your normal travels. Maps can answer the questions, "What does the other side of that hill look like?" and "Is there anything flyable on that next ridge?"

Common road maps are a start; they generally show lakes and rivers, which are often a rich source of slope sites. This is because water out in front gives unobstructed wind into the slope face, and because the geologic action of running water cuts a riverbed that may leave slopes on the riverbanks.

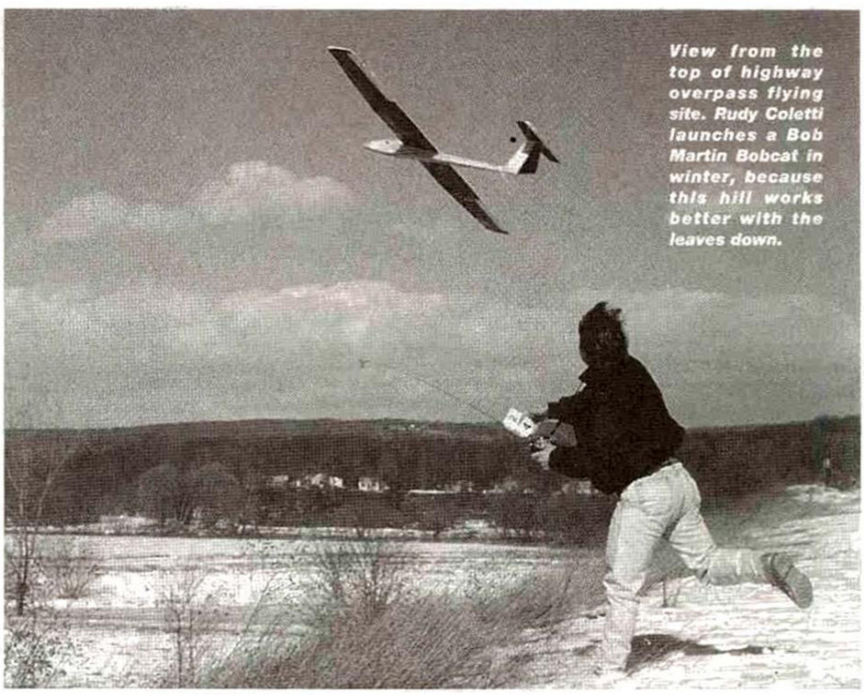
Topographic maps are far more useful; they show land elevation and contours, water features and large and small roads. Topo maps show political boundaries and will indicate if an area is public park land.

Two of the most useful features of topographic maps are the contour intervals that show both the shape and steepness of hills, and the green shading that shows forests. The green shading is particularly helpful for slope searchers in the northeastern U.S., where we have plenty of hills but many slopes that are unusable because of tree cover.

If you're new to using a field compass or topographic maps, go to the library. For advanced references, look up "Orienteering" in the card catalog. Orienteering is a field sport that intimately incorporates maps and compasses into hiking/navigation tasks.

SOURCES

Topographic maps are available from hunting, fishing and sporting goods stores and from some larger book stores. Some state governments publish topographic maps, but the mega-source is the U.S. government: the Department of the Interior's U.S. Geological Survey. For free indexes to the maps available and catalogs of their incredible offerings, contact USGS Information Services, P.O. Box 25286, Denver, CO 80225; (800) HELPMAP or (303) 202-4700; fax (303) 202-4693. The USGS works cooperatively with universities and state transportation departments to combine access to state and federal government map resources at several Earth Science Information Centers. For a list of ESICs or a list of USGS map dealers in each state, call (800) USA-MAPS; the ESIC website is **http://www-nmd.usgs.gov/esic**; the USGS map dealer website is **http://www.usgs.gov.**



View from the top of highway overpass flying site. Rudy Coletti launches a Bob Martin Bobcat in winter, because this hill works better with the leaves down.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

AEROTECH INTL.

F8F Bearcat

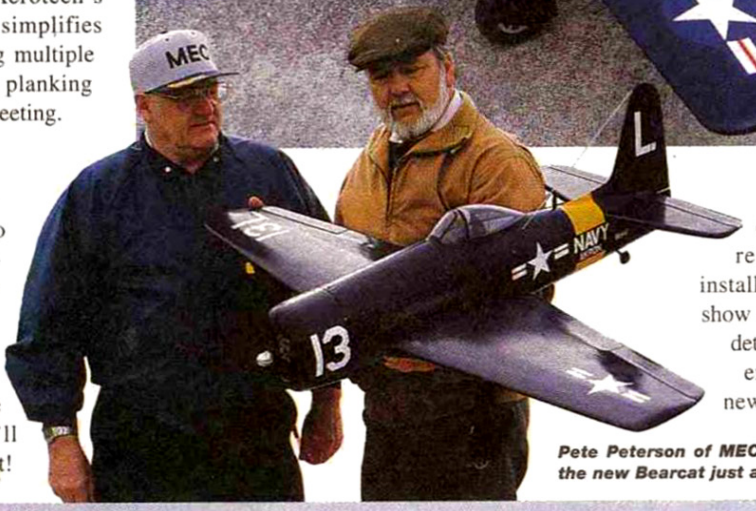
A warbird converted to electric power

by BOB BENJAMIN

This Bearcat is really something different! Produced in England by Aerotech Intl. and imported to the U.S. by Dare Hobby Distributors*, the 1/8-scale F8F includes foam-cores for the wings, tail surfaces and fuselage fairing sections. All foam parts are pre-sheeted with obechi veneer. The kit features a simple, built-up, sheet-balsa fuselage box that's rounded with sheeted-foam fairings to produce an attractively contoured structure. Aerotech's innovative kit design simplifies building by eliminating multiple formers and stringers, planking and compound-curve sheeting.

NOT FOR BEGINNERS

This airplane is by no stretch of the imagination a trainer. If you're comfortable with the challenge of flying this model as the heavily loaded scale fighter that it is, you'll have a great time with it!



PHOTOS BY BOB BENJAMIN

Pete Peterson of MEC (left) and Bob Benjamin (right) admire the new Bearcat just after its first test flight.

The kit also requires you to be experienced enough to make decisions regarding hardware and equipment installation. For instance, the plans don't show control horn or other control-linkage detail—not a problem for a truly experienced builder, but real trouble for a newcomer! I found the Bearcat to be a

real change of pace and an exciting project, both on the bench and at the field. Too often we get into a "same-old" rut; the Aerotech Bearcat will lift you out of that rut in a hurry!

The steerable tailwheel assembly screwed to the ply mounting plate furnished in the kit. A steering arm is soldered to the top of the wire strut; the pushrod is attached to the rudder servo.

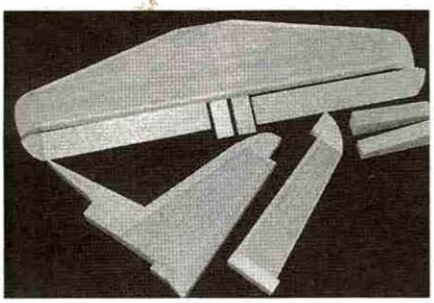
EVALUATION AND ELECTRIC CONVERSION

This article is a departure from the usual product review in that I will not only evaluate the kit, but will also present the details of a conversion to electric power using the Model Electronics Corp.* (MEC) Turbo 10/20 brushless motor system.

Many modelers consider an electric-powered scale fighter to be a project that has little chance of success. To make the point as strongly as possible that such a model can be built and flown successfully, I chose the Bearcat as perhaps the "hottest" fighter design in Aerotech's kit line.

WING CONSTRUCTION

The sheeted-foam wing and tail surfaces require that balsa leading-edge (LE) and trailing-edge (TE) strips and surface tips be added. I used aliphatic-resin wood glue for all primary structural assembly. Although epoxies and selected CAs will work well on white foam, they leave a hard joint line that makes it difficult to sand the skins to a smooth surface. All the control surfaces are preformed balsa and require minor



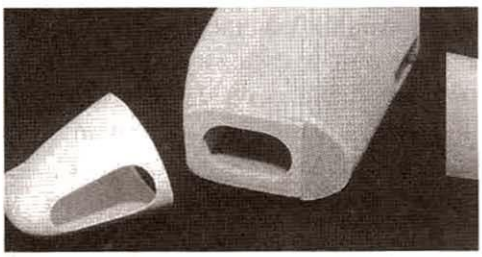
The tail surface foam sections with leading and trailing edges, tips, etc., glued into place before sanding.

shaping to fit well. Openings in the wing for center-section spar joiners, aileron servos and landing-gear (LG) mounts are not precut and must be made by the builder. The plans indicate individual microservos for the ailerons, so servo bays and aileron cable tunnels must be cut into the foam, and servo-bay covers must be made.

There is a discrepancy between the wing airfoil shown on the plan and the structure that's provided. The section shown is fully symmetric with a convex surface. When the sheeted-foam wing-cores and precut TE stock are joined, the result is actually a reflexed airfoil; that is, a symmetric section with a concave area just ahead of the TE. In fact, this works quite well and causes no problem when fitting the wing to the fuselage. Hardwood mounting blocks for a fixed main LG are provided, and their location is shown on the plan. Although a retract system is mentioned as an option, no installation details are provided.

RETRACTS

The full-scale Bearcat has an LG arrangement that is demanding to replicate accurately in model form. The main wheels retract so far inward that they actually lie within the fuselage, and the struts, which are long to provide ground clearance for the large diameter prop, include a section that folds in on itself during retraction to shorten the length of the retracted assembly! Reproducing this is not practical for a sport-scale model. The suggested main gear strut length is sufficient to clear any prop likely to be used on a glow engine and would retract properly into the wing. Since, however, this airplane was to have a geared electric power system that uses a 13-inch prop, I used the longest strut possible. I positioned the retract units so the struts were centered $10\frac{3}{8}$ inch from the centerline of the aircraft, and I moved the spanwise centerline an additional $\frac{1}{2}$ inch back from the LE. With the no. 653 shock-absorbing Robart* Robostruts trimmed to fit this layout and the Robart 605HD retract assemblies mounted flush with the lower surface of the wing, the main gear axles are then located properly for good ground handling without "groundloop" or "noseover" problems. Aside from the effort necessary to work out the conversion, the only problem I encountered was that a scale-size wheel would not retract to fit flush into the wing. Remember that on the full-scale F8F, the wheels actually retracted into the center-section fairing portion of the fuselage! It turns out that the airplane doesn't seem to mind this, and it's really tough to see the difference in flight.



The fuselage tail cone with a cooling air exit cut into the rear former, and the molded plastic tail fairing with corresponding air outlet.

Whether you opt for fixed or retractable gear, the mounting blocks or rails are glued directly to the foam-cores in whatever cutouts are made in the wing. Although the gear mounting blocks are solid, the foam they are glued to isn't! This concern was borne out during flight testing when I landed a few feet short on a grass strip with a sloping approach end, and one gear assembly—

SPECIFICATIONS

Model: Grumman F8F Bearcat

Type: sport scale

Manufacturer: Aerotech Intl. (imported by Dare Hobby Distributors)

Wingspan: 50 in.

Wing area: 460 sq. in.

Weight: 5 to 51/2 pounds (electric conversion—7 lb., 10 oz.)

Wing loading: 38 oz./sq. ft. (electric conversion)

Engine required: .40 2-stroke

Motor used: MEC Turbo 10/20 brushless

List price: $189.95

Features: the Aerotech Bearcat is an interesting military design that uses pre-sheeted, molded-foam components to reduce building time.

Comments: this is not a beginner's airplane. It demands experience to build, as well as to fly! I chose it as the subject of an electric conversion to demonstrate that an airplane such as this can be flown very successfully using electric power.

Hits:
- A very interesting subject.
- Sheeted-foam components.
- Flies very well.

Misses:
- Plans lack control and fitting details.
- Landing-gear mounting needs reinforcement.
- Cowl needed work to fit properly.

mounting rails and all—peeled right out of the wing. Although it turned out to be an easy repair, it reinforced my decision to restrict this hot little fighter to paved strips in the future. If I were to build this airplane again, I would include a full-depth center-section spar joiner of 1/8-inch aircraft ply extending out an inch or so beyond the ends of the fixed gear blocks or the rear mounting rails of the retract units. The LG mounting blocks would be glued directly onto the plywood. Though the fixed tailwheel installation is easier to build, I wasn't happy with the idea of a scale fighter with retracts that would seriously restrict ground handling. I made up a simple, steerable tailwheel using a .40-size tailwheel bracket mounted to a ply plate as shown on the plan, with a separate pushrod running back to the rudder servo.

FUSELAGE CONSTRUCTION

The fuselage construction is straightforward. Essentially, you build up a box structure and fill it out to scale dimensions with foam blocks. These are cut and pre-sheeted to very close tolerances. Several molded plastic parts, including a cowl, tail-cone fairing and wing root air intakes, are provided. The parts in my kit fit well, with the exception of the cowl. It was so oversized that the rear edges stuck out beyond the fuselage sides at the firewall by about 3/8 inch. I solved the problem by cutting a V-notch into the rear edge of the cowl on either side and drawing the edges together with a strip of glass cloth and some Hot Stuff to hold everything in place. A little 21st Century* primer and some sanding restored its smooth surface.

If you're building the Bearcat for glow power, finish the fuselage construction according to the plans and go on to final assembly and equipment installation.

If you use air-operated retracts, as I did, the only sensible place to mount the air tank is in the tail cone, behind the wing. A retract installation requires some careful planning and fitting, but a Bearcat doesn't look right in flight with the wheels down, and there is a noticeable increase in speed with the gear up. The Robart 605 HD system has functioned perfectly.

The rudder and elevator servos are mounted on an 1/8-inch ply tray; note the double output to the rudder and tailwheel. The Robart air tank is a snug fit in the tail cone, and it stays in place on a strip of Velcro®. Note the nylon cable ties that keep everything in place.

I installed my Airtronics* Vision with a 92785 receiver and 94141 high-torque microservos for the rudder, elevator, ailerons and LG selector valve switching.

WEIGHT AND BALANCE

Aerotech suggests a finished weight of 5 to 5½ pounds with a glow engine installed. My completed model, with all equipment *except* the motor battery pack installed, weighed 5½ pounds. To balance at the indicated location, it required the entire weight (2 pounds, 2 ounces) of the motor battery to be as far forward as possible. As the Turbo 10/20 motor and speed control weigh about the same as a typical .40 engine, I suggest that this much balance weight will have to be added to models that use glow engines, and that my electric-powered airplane's flying weight of about 7½ pounds is probably close to what most glow-powered versions will weigh. Omitting the retracts, steerable tailwheel and painted finish will reduce the overall weight, but almost certainly won't eliminate the need for substantial nose ballast. This is not an uncommon situation for scale models of radial-engined fighters, and I think it needs to be pointed out that this is a situation where the often-mentioned weight disadvantage of electric power doesn't exist!

FLIGHT PERFORMANCE

Knowing that this airplane was not only a short-coupled, high-performance fighter, but was also more heavily loaded than I would prefer, I checked alignment, balance and radio functions very carefully before heading out for the first test flight. Experience with other electric fighter conversions and power-loading calculations convinced me that the airplane would fly, but I was prepared to be very cautious with low-speed flight and landing. The Bearcat's aggressive performance was everything I had hoped for, but I re-emphasize that this is not a model for new pilots.

• Takeoff and landing

This is a fighter! Just like the full-scale Bearcat, this model demands to be flown off the ground and back on again with plenty of speed. If you pay attention, it will reward you with exciting performance. Assertive use of the rudder keeps it straight on takeoff. Liftoff is effortless after a run of about 100 feet, and the airplane initiates a very scale-like climb. I would not suggest trying to force it off the ground. Landings *must* be made under power; about ¼ throttle all the way down final is the way to go. Landings require a consistently descending approach with about 20 to 25 percent power held on right to the end of the strip. After the airplane is over the runway and a few feet off the ground, ease the power off, gently level off, and the Bearcat will grease itself on! Don't try a gliding approach; big Bearcats wouldn't tolerate it, and neither will this one. The power available in this electric conversion is consistent with what the suggested glow engines would provide. Considering the balance weight that a glow version would require, I feel that there is little difference between the weight and loading of the glow and electric versions.

• High-speed performance

The Bearcat cruises easily at about ¾ throttle, and at full power it gives the impression of being quite fast. Stability is excellent. The model flies as though it were on rails at medium and high speeds.

• Low-speed performance

This is not an airplane to be flown at low speed. As power is reduced at a safe altitude, control authority slowly degrades. The airplane stalls straight ahead and recovers easily when power is added. At low-power settings, however, it is going to *descend!*

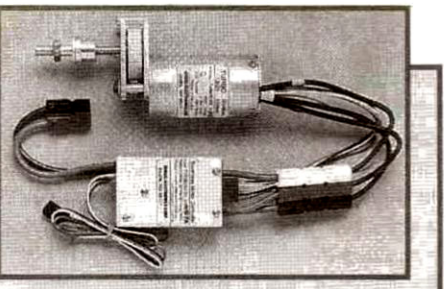
• Aerobatics

Loops, rolls, split-S's and other typical fighter maneuvers are straightforward and look great if you understand the way WW II fighters performed them: fast and wide. This airplane is really smooth, as long as the speed is kept up.

• Flight time/duration

Using the new SCR 2000 cells, I have been getting flight times on the order of 5 minutes using 60- to 75-percent power for cruise and full throttle for aerobatics. Not wanting to experiment with dead-stick landings, I haven't kept the Bearcat in the air long enough to experience a power drop-off. Power left in the pack after landing suggests that there's 1-plus minute left.

THE ELECTRIC CONVERSION



Conversion to electric power isn't very complicated. Aside from careful choice of equipment, no specific weight reduction program was carried out. The structural design of this kit does not lend itself to material removal or replacement. I accepted this as another opportunity to demonstrate that models for electric power don't have to be fragile ultralights.

I installed the MEC Turbo 10/20 brushless motor with its proprietary speed controller and a motor battery pack. A word about this new motor is in order. The simplest description I can offer is that brushless motors uses electronic control to run, rather than the commutator that is in physical contact with current-carrying brushes. In the case of the brushless motor, the speed controller performs a current-switching function necessary to operation as well as allows for power variation. A brushless motor will run only with the controller specifically designed for it. In return for this added complexity, you get significantly increased efficiency as well as the ability to operate a given motor on a wide voltage range. The Turbo 10/20 will run as well on 10 cells as on 20; that is, it can be several different motors depending on the size of battery pack used. This is comparable to having a glow engine that can be transformed from, say, a .20 to a .40 when you change the fuel tank!

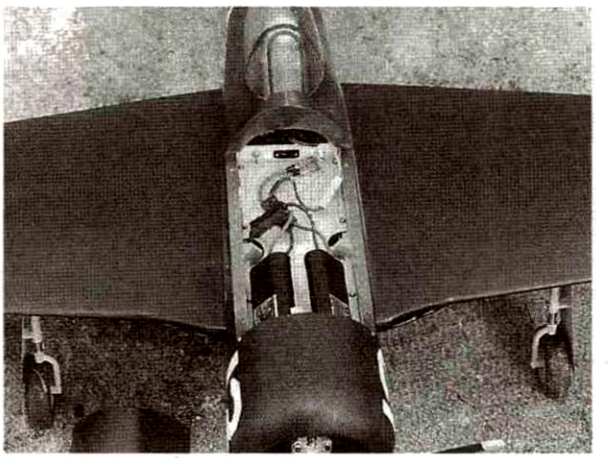
After evaluating the kit, Pete Peterson of MEC and I decided to match the new motor to a 4:1 gear ratio version of this Superbox reduction gear. Power loading calculations indicated that a 16-cell pack of the new SCR 2000mAh sub-C cells would give the Bearcat the power to fly the way we wanted it to. MEC assembles these cells in a special end-to-end pack configuration that reduces losses and produces a noticeable performance increase. All this power is converted into thrust by a Master Airscrew* Electric Series 13x8 prop, which turns at about 7,300rpm. This combination flies the Bearcat as though a hot glow engine were on board, with flight durations of 5 to 6 minutes.

The motor is mounted to the firewall using a Hayes* BL-19 glow engine mount. Cooling air inlet holes were cut in the firewall former, and an air outlet was made in the tail former and in the tail cone fairing. The top/front sheeted foam fairing block was cut to end ahead of the canopy and made removable for access to the motor battery, and the cutoff portion was attached to the front of the top/rear foam fairing. A motor battery tray was added in place of a fuel tank "floor." As per the practice I have followed with my electric conversions and own electric designs, I added ¼-inch-square spruce rails along either side of the fuselage interior and attached the ⅛-inch ply battery tray to them with sheet-metal screws, thereby regaining the structural integrity that would otherwise be lost by making the top cowl detachable. The removable top cowl is keyed in place using four pieces of concentric plastic pushrod. The large outer pieces are buried in the main fuselage structure, and the inner pieces protrude from the bottom of the cowl. A simple latch made of music wire and brass tube fixes the cowl to the firewall former and keeps everything in place.

COVERING AND FINISH

I chose not to use an iron-on plastic film covering for the Bearcat. Although this approach would have saved a few ounces in finished weight, there are a number of areas on this airplane, such as the fillets around the tail surfaces, that would be nearly impossible to cover neatly with film. Not only did I feel that a painted finish would be more appropriate for a scale fighter, but I also wanted to emphasize that with the power systems now available, proper use of materials and good craftsmanship make durable, interesting painted finishes practical on electric-scale models.

After adding a pilot figure and simple cockpit headrest detail, I glued the canopy into place, masked off all of it except the portions of framing that were to be painted, and let the finishing process hide the edges. After filling all the dings and low spots with vinyl spackle and sanding everything as smooth as I could, I used silkspan as a finish base. This was applied wet, directly over the obechi skins, using clear nitrate dope as an adhesive. After applying a second coat of nitrate to assure that the silkspan was securely stuck down, I switched to 21st Century white primer, building up about four coats and letting each dry thoroughly, then sanding off most of the primer buildup. This achieves a smooth finish that's free of pinholes and fuzz without adding excessive weight. I then sprayed the rear fuselage with 21st Century Cub Yellow, masked off the Naval Reserve yellow band, and sprayed the entire airplane with Dark Blue. All other markings were applied after the finish had been given a week to dry thoroughly, using pressure-sensitive vinyl markings from Vinylwrite Custom Lettering*, which offer a custom package for this airplane.



With the top cowl off the fully assembled Bearcat, you can see both 8-cell "sticks" of the 16-cell battery pack that extend through the firewall all the way to the front of the cowl to balance the airplane. All switches and hookups for the retract system are inside, under the top cowl.

FLYING

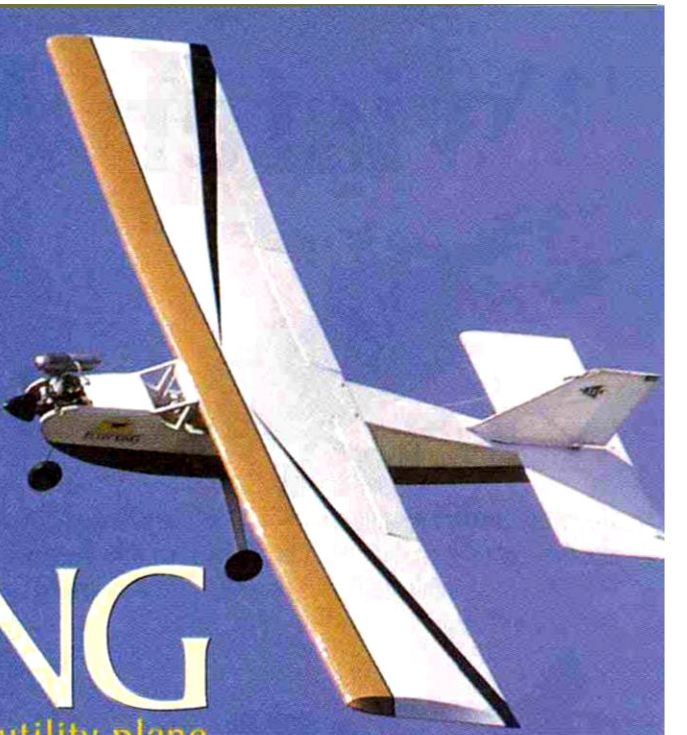
This little Bearcat is a hot-dog fighter! It demands some experience to fly, but is not tricky. I balanced the Bearcat at the location shown on the plan by moving the motor battery as noted. No thrust line offsets are suggested, so I didn't use any. No wingtip washout is shown on the plan or built into the precut wing cores. I added several degrees (about 1/16 inch up at the TE) of reflex to each aileron to add effective washout and provide insurance against tip-stalling at low speed. So adjusted, the Bearcat will fly hands-off level at about ¾ power, and stalls at reduced power are straight ahead. I haven't tried flying without the aileron reflex!

In flight, the Bearcat is remarkably smooth and stable. Properly trimmed, this is a very enjoyable airplane to fly. All told, this is an exciting airplane. If you accept the idea that a scale model of a WW II fighter should make the same demands on its pilot as does the large version, you'll enjoy the challenge and performance of this airplane. Mine commands attention whenever I take it out.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW



Bruce Tharpe Engineering

FLYIN' KING

A user-friendly utility plane

PHOTOS BY STAN KULESA & GERRY YARRISH

by STAN KULESA

The Bruce Tharpe Engineering* (BTE) Flyin' King was designed to be a utility plane. It can be used for in-flight photography and aerial videotaping, and to tow banners and sailplanes, drop candy, streamers and parachutes, launch gliders ... is your interest piqued yet?

With an 80.5-inch span, the Flyin' King is a very large airplane, but it doesn't require a very large engine (a .60 to .75 2-stroke or .80 to .91 4-stroke are recommended). You can build it with or without flaps, but I highly recommend that you include them, especially if you've never used flaps on a model before. Flaps markedly enhance slow-flight performance—one of this model's best features. The ailerons are extra large and remain effective even at slow speed with flaps fully extended. The Flyin' King is a user-friendly model that's fun to build and fly.

THE KIT

The stringers and sheeting are neatly rubber-banded together. The wing ribs, formers and other parts have been machine cut and sanded to their final shapes using templates for accuracy. The kit also includes aluminum landing gear and a complete hardware set.

Two sheets of excellent blueprints for the wing, the fuselage and the empennage, and a detailed, illustrated instruction book make you feel as though Bruce Tharpe is standing over your shoulder explaining how to put his model together. My 13-year-old son, Jay, did all the building. I did the final sanding, covering and radio installation.

THE WING

Construction begins with the wing. Right off the bat, you must decide whether to use flaps. You can easily build the Flyin' King without flaps, but I encourage you to try them out.

The wing has a polyhedral configuration, i.e., the center section is flat and the two outer panels have some dihedral. Ailerons and flaps are built up and sheeted

with balsa. There are many cardboard templates used throughout construction, and one acts as a dihedral gauge to help set the proper angle for the ribs. The main spars are spruce, the flap torque rod assembly is hardwood, and just a few ribs and the servo trays are plywood; the rest is balsa.

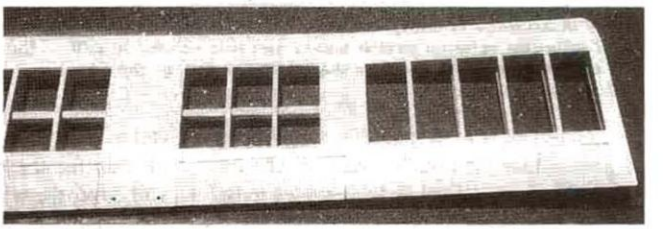
We used Bob Smith Industries* adhesives throughout construction: thin CA for balsa-to-balsa joints, thick CA for balsa-to-plywood joints and 6-minute epoxy for other high-stress areas (such as where the outer wing panels join the center section). The instructions suggested using adhesives such as yellow glue in some spots, e.g., on the ribs where the balsa sheeting was to be mounted, but we had good results with CA.

Despite its size, the Flyin' King is rather solid. The wing is stiff because of the 3½-inch leading-edge and 1-inch trailing-edge balsa sheeting, webbing, center-section balsa sheeting and capstrips. Everything fits together very nicely.

THE FUSELAGE

When we began construction of the fuselage, we marked the firewall to accommodate the motor mount. We chose to use a Hayes Products* mount.

The Flyin' King can be built as either a tail-dragger or with tricycle landing gear. (BTE offers a high-quality tailwheel assembly for under $10.) We built ours with tricycle gear, so the firewall had to be drilled for the nose-gear assembly, as well.



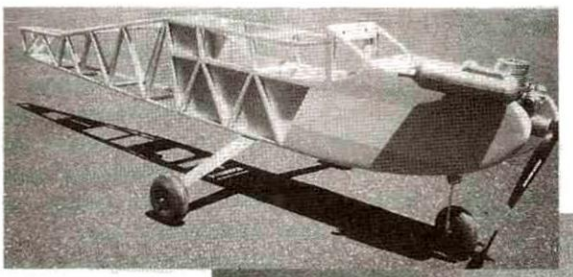
The top of the wing. Its center section is flat and is roughly 34 inches long. Each of the two outer wing panels is approximately 23 inches long. Ailerons (3½x21¼ inches) are built up and balsa sheeted.

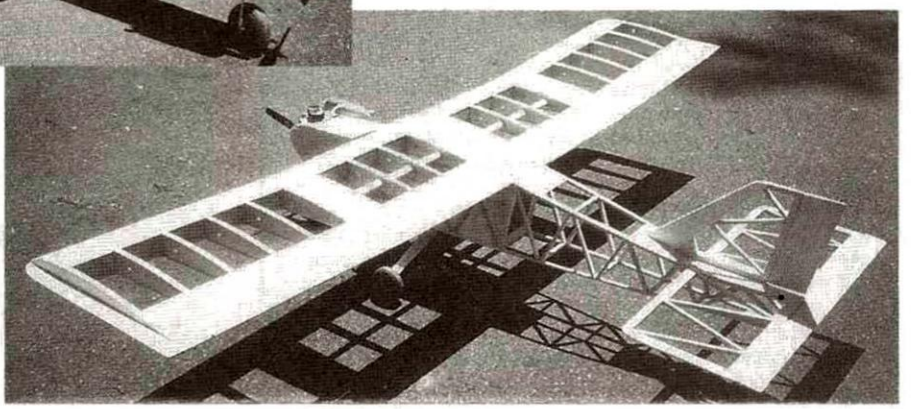
Most of the fuselage is balsa. However, there is a plywood doubler from the nose through the cabin area and on the bottom of the fuselage. The firewall, three formers and the landing gear plate are plywood. The wing hold-down blocks are hardwood.

The fuselage uses a truss-style construction method. As such, it's one of those models that would look terrific with transparent MonoKote*. The lite-ply doubler has notches into which the formers and firewall neatly fit. I used my Hobbico* builder's triangle set to get each of these formers square and perpendicular to the fuselage sides.

We used 6-minute epoxy to attach the firewall and landing-gear plate to the fuselage. Otherwise, we used thin CA for balsa-to-balsa joints and thick CA for balsa-to-plywood bonds.

We used a Sullivan* 16-ounce tank, but there's plenty of room for a larger one. Durable aluminum main landing gear with a screw set for axles comes with the kit. I replaced this screw set with Du-Bro* axles, and we used Du-Bro 3¾-inch wheels.





Above: square 5/16-inch balsa sticks are used for the truss construction of the two fuselage sides. They're reinforced with 1/8-inch lite-ply doublers that extend from the nose through the cabin area. Right: the Flyin' King in the bones ready for final sanding and covering.

THE EMPENNAGE

The empennage resembles the truss construction used in the fuselage. The fin is built of 5/16-inch balsa stock. Likewise, the rudder is 5/16 inch, but it is of solid stock. Embedded in the rudder is a 1-inch-square,

SPECIFICATIONS

Name: Flyin' King

Manufacturer: Bruce Tharpe Engineering

Type: sport/utility aircraft

Wingspan: 80.5 in.

Airfoil: semisymmetrical

Weight: 9.5 to 10 lb. (review kit weighed 8.25 lb.)

Wing area: 1,280 sq. in.

Wing loading: 15 oz./sq. ft.

Channels req'd: 4 (aileron, rudder, elevator and throttle); an additional channel needed for flaps.

Engine req'd: .60 to .75 2-stroke or .70 to .91 4-stroke

Engine used: O.S. Max .61 SF

List price: $149.95

Features: machine-cut balsa, lite-ply and spruce parts; aluminum landing gear, complete hardware pack including pushrods; decals; hinges, rolled plans and instruction book.

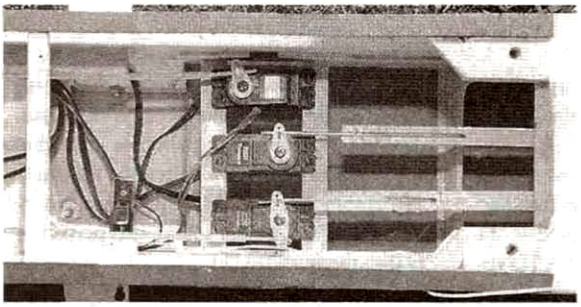
Comments: the quality of all materials is exceptional, and the instruction manual walks you through each step very thoroughly. As advertised, the Flyin' King flies very well and is very maneuverable. Build this model with flaps—it's worth it! You'll appreciate the slow flight characteristics. Be sure to take advantage of this model's utility capabilities.

Hits

- Superb quality balsa and plywood.
- Very clear and easy-to-follow instructions augmented by clear photos.
- Very versatile airplane capable of a wide range of functions.
- Built in about 3½ weeks.

Misses

- Stock for elevator is a light balsa and won't handle much "hangar rash."
- Servo lead tubes in wing are too far back from the aileron servo tray.



Radio installation is easy; there's plenty of room to work. I used a Du-Bro external switch mount and was careful to drill the hole for this unit through the center of one of the 5/16-inch-square balsa sticks.

1/16-inch-thick lite-ply pad that strengthens the area where the horn is mounted. The fin and rudder were intentionally designed to be short to help avoid the towline when used as a sailplane tug.

The stabilizer is built of 3/8-inch balsa stock. As with the vertical pieces of the empennage, the elevator is made of solid balsa stock.

RADIO AND ENGINE

There's plenty of room in the fuselage to fit my oversize hands. Each wing panel has an aileron servo that sits in a plywood tray included with the kit. The flap servo rests in a similar tray. You'll need two 12-inch servo extensions and a Y-harness to complete the radio connection for these flying surfaces. Before you cover the wing, insert the servo extensions and tape them into place; trying to snake these through the wing after it has been covered is a real pain because the servo tray is in front of the servo lead tubes.

The aileron horns are epoxied into the aileron. The kit comes with pushrods for the ailerons and a torque rod for the flap.

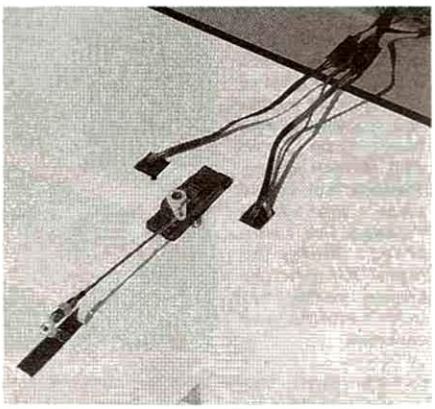
Inside the fuselage, the servos are positioned to the rear of the cabin to maximize payload space. The kit provides hard balsa stick for pushrods for the elevator and rudder.

The kit provides 1/16-inch music wire for the servo end and threaded pushrod wire for the surface end. I used Z-bends at the servo connection. The kit also provides flexible steel cable material that neatly fits through nylon tubing for the throttle and nose-gear pushrods.

We powered the King with an O.S.* Max .61 SF 2-stroke swinging an 11x6 prop. Because the firewall is pretty far back, we pushed the engine as far forward as it would go and tapped the motor mount accordingly. There was adequate clearance for the prop. We used a 2 1/2-inch black Great Planes* spinner.

FINISHING

We used tan MonoKote for the leading edge and the bottom third of the fuselage. I used some Carl Goldberg* 1/4-inch black pinstriping to hide the seam between the tan and white MonoKote and two black MonoKote sunburst patterns to break up the "whiteness" on top of the wing.



The flap servo connection. Note the servo leads coming through the wing.

We ironed on the white MonoKote first. Keeping in mind that the leading edge is 3 3/4-inch sheet balsa, I ironed the white onto only 1/4 inch of the back end of the leading edge. I used my straightedge to cut several 4 1/2-inch-wide strips of tan MonoKote and ironed them over the 1/4-inch white overlap to the leading edge. If you follow this pattern, be sure to do the bottom wing panel first to get the "shingle effect."

As with the wing, I covered the fuselage with white MonoKote first. Again, I

FLIGHT PERFORMANCE

• Takeoff and landing

The Flyin' King is easy to take off and land. Although it can be built as either a tail-dragger or with tricycle gear, I chose to use tricycle gear. I gradually throttled up and fed in some right rudder and the model was airborne. Ascent was graceful, slow and stable. (For those of you with short runways, goosing the throttle will get you airborne in just a few feet.) I applied just a little down-trim for straight-and-level-flight.

I did not use the flaps for the first landing. Instead, I throttled down and let the plane settle at less than 1/4 power. It was exceptionally stable. Before trying the flaps, I did a dead-stick landing as well. The Flyin' King will float "forever" with a little up-elevator. As with the powered landing, descent was gradual and stable. Finally, I tried the flaps for landing, and the ailerons remained very responsive, even with fully extended flaps and idling throttle. I needed to hold in a bit of down-elevator with the flaps fully extended. Less down-flap will proportionately require less down-elevator. Of course, those of you with computer radios can easily set a flap/elevator mix to compensate for the aerodynamics of these surfaces.

The proud builder, Jay Kulesa, checks out the model.

• Low-speed performance

Predictably, this model excels at low-speed flight. The Flyin' King begs you to drop the flaps and throttle back. We flew on a day with virtually no wind, but I am convinced that the Flyin' King would come to a stop midair with a headwind, low throttle and flaps dropped. Low passes and touch-and-go's were slow and graceful.

• High-speed performance

This portion of the flight performance critique is simple: the Flyin' King doesn't fly fast. It's noteworthy that not all pilots measure fun in miles per hour.

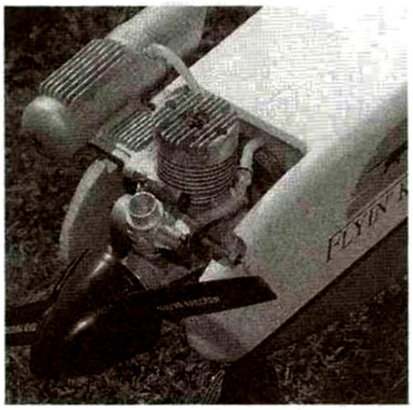
• Aerobatics

The Flyin' King is very maneuverable. I expected large barrel rolls but was able to bang through three consecutive rolls right on the axis! Likewise, I anticipated a spiral but got a spin. (Admittedly, the spin was a bit larger and less crisp than that of the average sport aircraft.)

The Flyin' King handled loops well. Considering the plane's size and the fact that I chose to power it with a .61, the loops were large and round; it did not fall out of the top of the loop. The kit's instructions say you can do a loop using flaps alone. This places a lot of stress on the flap servo, but I couldn't resist trying it at least once. It worked! Inverted flight was equally pleasing. With very little down-elevator, the Flyin' King flies just as well upside-down as right-side up. (Keep in mind that the center section of the wing is flat and has very little dihedral in the two outboard wing panels.)

Although the Flyin' King is quite suitable for utility functions, many modelers will choose it for relaxed sport flying. It is easy to see, easy to fly and easy to land.

took my straightedge and cut a 63x8-inch length of tan MonoKote for the bottom third of the fuselage. I overlapped the white with the tan MonoKote by about ⅓ inch and began to iron. Since I had not yet covered the bottom of the fuselage, I put on an oven mitt and supported the joint



An O.S. Max .61 SF on a Hayes engine mount powers the King. Because of the model's long fuselage cheeks, I had to slide the engine as far forward on the mount as possible. Both cheeks required minor routing to accommodate the needle valve and muffler.

where the two colors met from behind and applied the iron. After I ironed that seam, I ironed the rest of the tan MonoKote to the frame. Don't use a heat gun anywhere near the seam; it will cause the crispness to deteriorate.

The Flyin' King kit comes with a clear plastic windshield and cabin windows. Instead of using those, I used clear MonoKote. I made a template of the windows with a ¼-inch overlap for the MonoKote to be attached to the fuselage. I used the supplied stick-on decals on the front of the fuselage and on the fin.

CONCLUSION

Jay and I really enjoyed putting this beast together. Jay doesn't have a lot of building experience, but the instruction manual walked him through each step very thoroughly. The quality of all materials was exceptional.

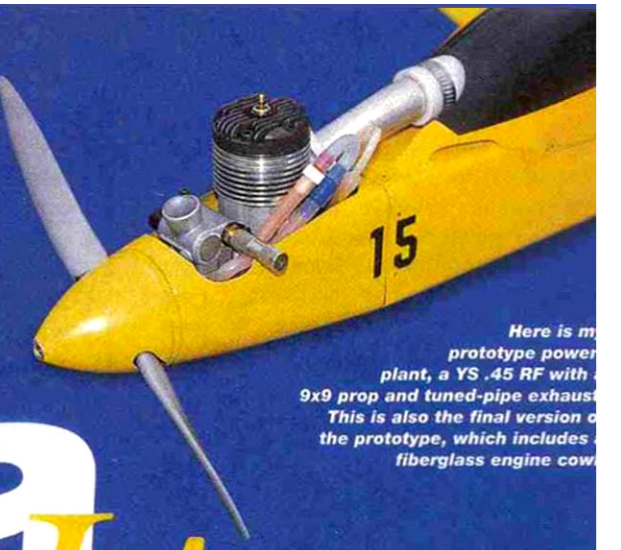
As advertised, the Flyin' King flies very well. I was pleasantly surprised with its maneuverability despite its size and trainer-like appearance. Build this model with flaps—it's worth it! You'll appreciate the slow flight characteristics. Be sure to take advantage of this model's utility capabilities. Try towing, dropping, launching, or photographing with it. Be creative; you'll be a crowd-pleasing hit at your club's next flying demonstration!

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

Ducted-fan performance with a low-tech approach

The Lyka Jet

by JACK ZIMMANCK



Here is m
prototype power
plant, a YS .45 RF with
9x9 prop and tuned-pipe exhaus
This is also the final version o
the prototype, which includes
fiberglass engine cow

THE FIRST TIME I saw the fast, smooth flight characteristics of a ducted-fan model, I was hooked, but I did not want the temperamental operation and expense that often go with these exciting and graceful birds. I tried a couple of the prop/jet look-alike kits. They looked OK, but the performance and flight characteristics were not even close. What I wanted just was not available. That left me just one alternative.

I decided the best way to achieve the shape, balance and weight for the Lyka Jet was to design the airframe, "from the inside out," around the components. I weighed the engine, pipe, tank and radio gear and dumped them on the workbench over a blank sheet of drafting paper. I began to develop the long-nose, short-coupled jet silhouette that distinguishes the Lyka Jet. The swept wing and the tall, swept fin further define the Lyka Jet profile. The final touch of jet realism was to route the exhaust out through the rear of the plane. I chose a .40-size engine since it is fairly inexpensive and can easily be set up to turn the necessary rpm. The power system for the prototype was an O.S. .46, rear exhaust with a tuned pipe, a 9x9 APC* prop and an 8-ounce tank. To keep the cost down, all servos were Futaba S148s with ball-bearing kits added to keep the controls slop free.

The name? Everyone who saw the prototype said it really looked and flew like a jet.

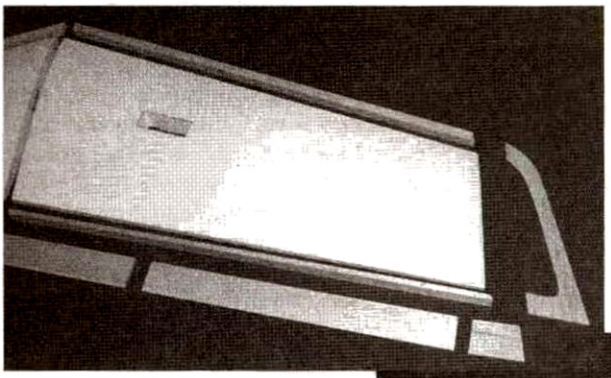
LOW-TECH APPROACH

To keep building simple and inexpensive, low-tech building materials are employed wherever possible. You can get a lot of the Lyka Jet materials at your local lumberyard. Perhaps I went a bit overboard on low-tech when I chose 2½-inch-square PVC downspout material for the fuselage. Where wood is joined to the PVC fuselage, I use Plumber's Goop (lumberyard), The fuel tank is an 8-ounce shampoo bottle (grocery store) with a Sullivan* tank stopper kit. The aileron stock, wing sheeting, tail feathers and plywood will require a visit to your local hobby shop. The canopy/pipe tunnel on the prototype is from the Escape kit by Bridi Aircraft Designs*. The foam

This version has conventional tricycle landing gear. The original (and fastest) version has a wire landing skid and is hand-launched.

wing-core templates are shown on the plans, and foam wing-cores can be ordered from Wing Mfg.* Prototype one had no cowl. For the second prototype, I formed a fiberglass cowl.

will outperform many ducted-fan jets. At full throttle, you really have to think ahead of it, but it will slow down for gentle landings as long as the weight stays below 5½ pounds.

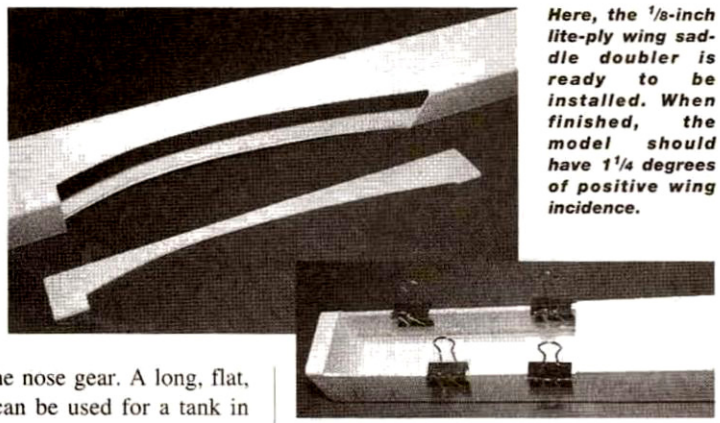


Above: the Lyka Jet has a foam wing sheeted with 1/16-inch balsa. Here, all the wing parts have been cut out, and the foam-core is ready to be sheeted. Right: the fuselage is very low-tech; the main body is a piece of 2½-inch-square PVC downspout material. Lite-ply doublers reinforce the cutout areas, and the plywood firewall is removable and held in place with screws.

CONSTRUCTION

• **Wings.** The wings are standard foam-core construction with 1/16-inch balsa sheeting. Start by lightly sanding the cores while they're in the foam cradle. Cut all the necessary servo or landing gear openings with a sharp paring knife. The servo boxes are at the high point of the wing and will accommodate a standard servo standing straight up. Servo output arms are on top of the wing in hand-launched models. Install ¾-inch filament packing tape (or ½-inch carbon-fiber strips) for stiffness and strength.

Prepare the wing skins by trimming the edges of the 1/16-inch balsa sheets to join without gaps. Join the sheets along the full length of the seam with ¾-inch masking tape, then turn the sheets over and open the seam by folding it back over the edge of the workbench. Glue the seams with medium CA, and close the seams on the bench top. Sand immediately with 100-grit sanding block to drive balsa dust into the seam. Repeat until all seams have been completed, then remove the tape. Cut the skins to shape leaving ⅜ inch all around the wing planform. Spread a very thin coat of two-hour epoxy on the inside of the skin, and lay the skin epoxy-side-up in the foam cradle. Put the wing-core on top of the skin in the cradle, then apply epoxy to the inside of the top skin and apply the skin to the core in the cradle. Put the top cradle on top of the skinned core, lining up all the corners,



Here, the 1/8-inch lite-ply wing saddle doubler is ready to be installed. When finished, the model should have 1¼ degrees of positive wing incidence.

Here, the lite-ply doublers for the horizontal stab are being glued into place. Note the clamps. The adhesive for gluing wood to PVC is Plumber's Goop.

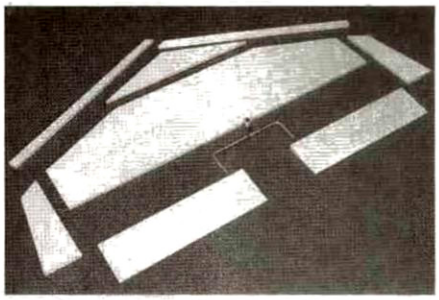
CONFIGURATION

Before you start, take some time to decide just how much performance you want. A hand-launched airplane gives the lightest weight and best performance. It is also easier to build and looks great in the air with no landing gear hanging down.

Fixed gear can be installed but adds ½ pound to the total weight. Retracts are a 12- to 14-ounce weight penalty and will bring the wing loading up pretty high. Retracts may also require a fuel pump so that the fuel tank can be moved over the wing to make room for the nose gear. A long, flat, shampoo bottle can be used for a tank in this type of installation.

Though the Lyka Jet was designed specifically for a tuned pipe, it will be a good performer with a standard muffler. The muffler up front may require a bit of rebalancing to get the CG correct.

If you set it up with a tuned pipe and no landing gear, you will have a plane that



The tail surfaces are made of 1/4-inch sheet balsa. Use lightweight balsa for the surfaces and hard balsa for the LEs and hinge lines to save weight.

SPECIFICATIONS

Name: Lyka Jet

Type: sport prop/jet

Wingspan: 50.5 in.

Length: 43.5 in.

Weight: 5.25 lb.

Wing area: 555 sq. in.

Wing loading: 21.79 oz./sq. ft.

Airfoil: fully symmetrical

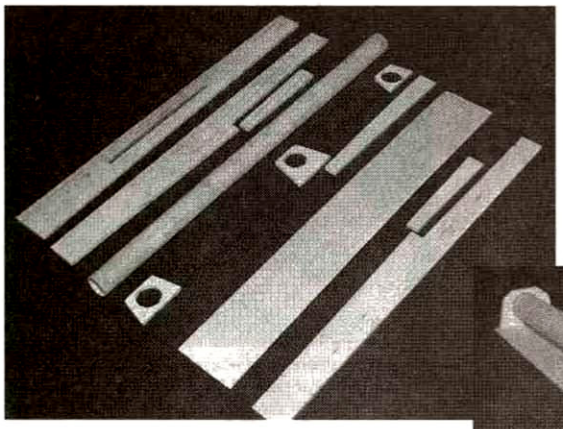
Radio: 4- or 5-channel (ailerons, rudder, elevator, throttle; optional retract)

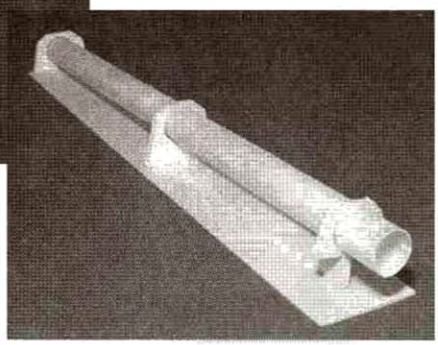
Engine: .40 to .45 (with tuned pipe)

Features: the Lyka Jet has a balsa-sheeted foam wing, PVC downspout fuselage and removable tail assembly. The tailpipe is housed within the tail assembly, and air ducts channel air into the tail section to help cool the pipe. Balsa ply and lite-ply are used to reinforce the PVC fuselage. The canopy/pipe tunnel is from a Bridi Aircraft Designs Escape kit.

Comments: performance is as close to a ducted fan as I could make it without the used of an impeller and an expensive ducted-fan engine. Speed ranges from 30 to 170mph. The model can be built with and without landing gear as shown on the plans. Foam wing-cores are available from Wing Mfg.

PHOTOS BY WALTER SIDAS & JACK ZIMMANCK





Above: here are the parts for the removable tail section. The tailpipe tube is made of 6-ounce fiberglass cloth and wrapped around a 7/8-inch-diameter, wax-paper-wrapped dowel. Saturate the cloth with thin CA to form the tailpipe.
Left: the tailpipe is supported with balsa formers attached to a 1/16-inch ply floor.

and set the cradle stack on a straight, flat surface with a flat board covering the top. Evenly distribute 50 to 60 pounds of weight on the stack. (Books and magazines work well.) Repeat with the other wing-core and leave the cradles weighted for 36 hours.

Remove the cores from the cradle, trim off the excess skin, and add the LE and TE and wingtips per the plan. Sand the roots of the panels and then join them to produce 7/8 inch dihedral under each panel tip. Use 6-inch fiberglass cloth on the top and bottom of the center section for added strength.

• **Fuselage.** The fuselage is a 40 1/2-inch-long section of 2 1/2-inch-square PVC downspout. (How's that for low tech?) The 1/8-inch lite-ply doublers and formers are glued to the PVC material with Plumber's Goop. Other wood-to-wood internal joints are made with 15-minute epoxy. The 1/4-inch ply firewall is removable for tank access and is screwed into place with 4x1/2-inch flat-head screws. The wing mounts are 1/4-inch ply and are epoxied to the doublers and reinforced with 1/2-inch tri-stock. Install wing mounts to achieve 1 1/4 degrees of positive wing incidence.

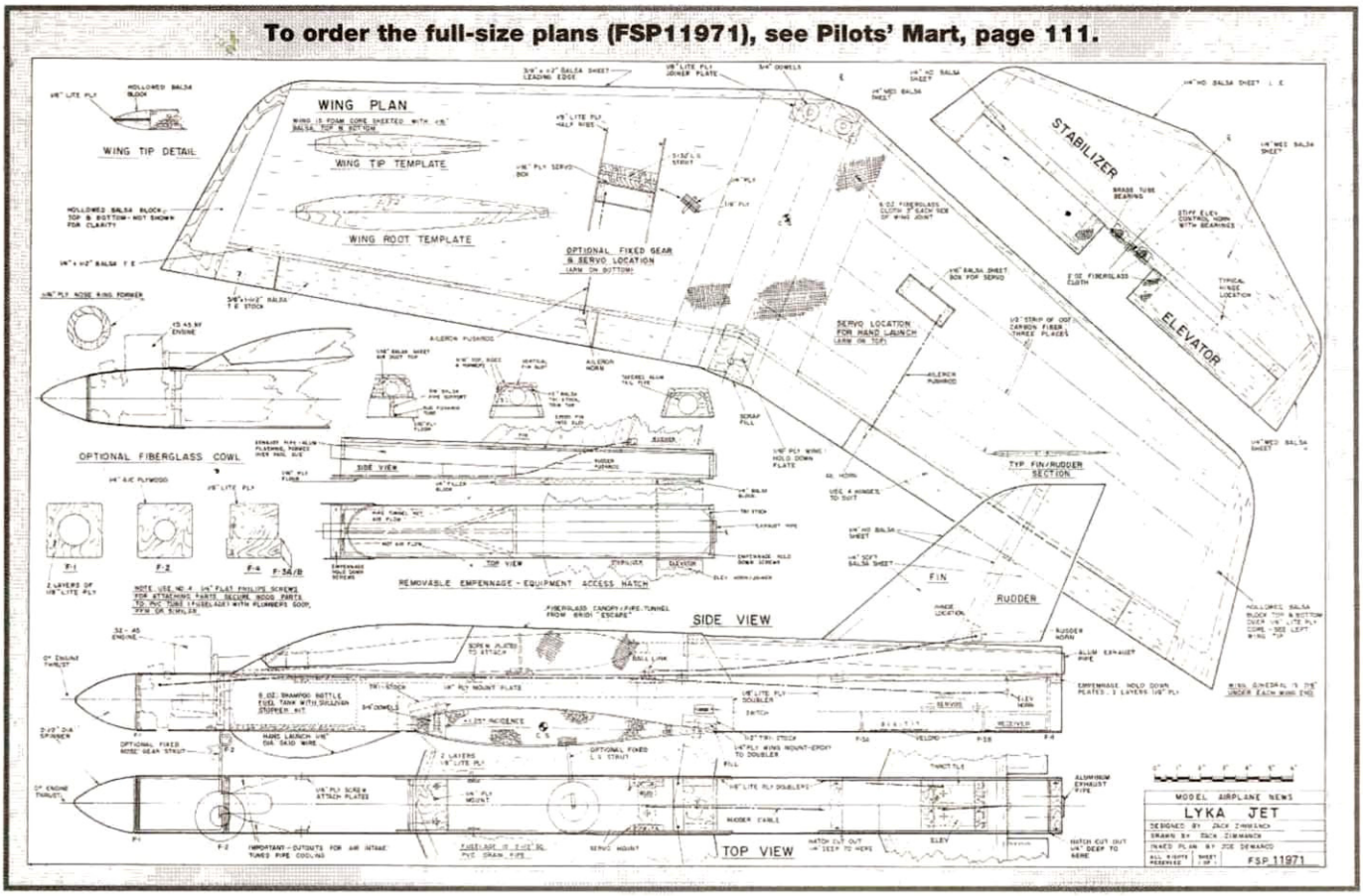
The rudder servo is mounted with the servo spline protruding through the fuselage top. Use a "quick-disconnect" on the rudder pushrod so the empennage can be easily removed. Before gluing, test-fit everything that will go into the fuselage.

• **Tail assembly.** The one-piece, removable empennage is a multipurpose component that serves as vertical and horizontal stabs, control surfaces, tailpipe, hot-air exhaust ducts and the access hatch for the rear fuselage equipment compartment. The empennage is built around the tailpipe. Construct the tailpipe by wrapping three or four layers of wax paper around a 7/8-inch-diameter dowel. Then wrap a 20-inch length of 6-inch-wide, 6-ounce fiberglass cloth lengthwise around the covered dowel. It will take just over two layers to form the tailpipe. Thoroughly soak the cloth with thin CA. A section of thin-wall aluminum lawn chair frame has also been known to work very well as a tailpipe.

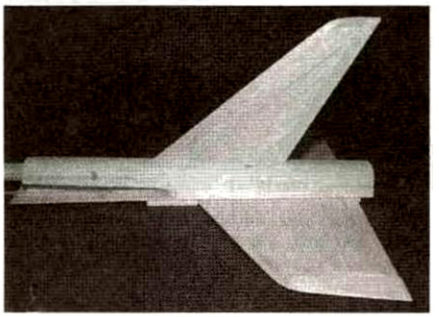
The pipe tunnel air ducts are very important, particularly in hot climates. Ducts should be kept as large as possible and free of obstructions.

For the stab and fin, use lightweight 1/4-inch balsa for the cores and hard balsa

To order the full-size plans (FSP11971), see Pilots' Mart, page 111.



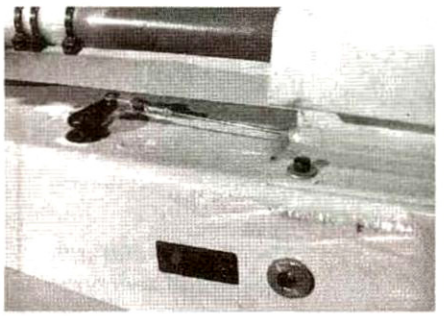
stock for the LE and hinge lines to keep the tail weight down and stiffness up. The empennage surfaces and tailpipe housing/ducts are mounted on the 1/16-inch ply hatch plate with zero degree incidence. Use a very stiff elevator torque-rod horn with bearings. The elevator halves must match exactly with no flex, as even a little mismatch will really show up at the speeds at which the Lyka Jet flies.



Here, the tail surfaces have been added to the removable section. The cutout area is an air-duct exit that helps keep the pipe cool within the fuselage.

POWER SYSTEM

High rpm and a high-pitch prop are the keys to the extreme performance of the Lyka Jet. If you use a .40- to .45-size engine with a pipe, cut the header to 3½ inches to start. Use a 9x8 or 9x9 prop and 10- to 15-percent-nitro fuel. This will give you 14,000 to 16,000rpm on the ground, and that will unload substantially in the air. You can tune the exhaust system more from there, but these settings are pretty user-friendly. Carefully mount the fuel



The rudder servo is under the wing and is mounted so that the servo spline and arm protrude from the fuselage. A "quick-disconnect" makes tail removal simple.

tank in foam padding to avoid fuel foaming. Engine runs with an 8-ounce tank are 6 to 7 minutes.

On tuned-pipe installations, allow clearance around the header entry into the pipe tunnel. Be sure to cut the inlet ducts in the front of the canopy. Use a compact pipe hold-down system and compact couplers to get the greatest possible airflow around the pipe.

FLIGHT PERFORMANCE

• Takeoff

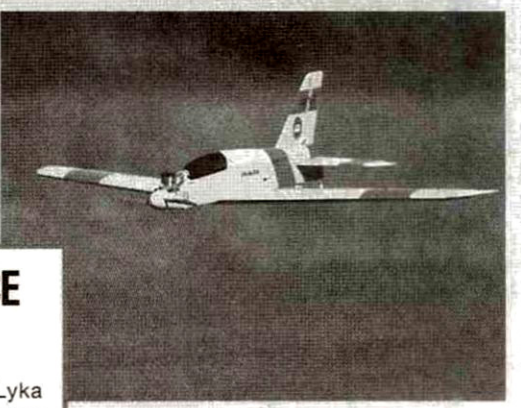
A little preflight launcher training is recommended. As with any hand-launch, be careful of crosswinds. Bring up full power for 2 or 3 seconds to get the engine on the pipe. Have the launcher give the model a brisk underhand toss directly into the wind with the nose up about 10 degrees. The high-pitch prop will cause a slight left torque for the first 20 feet or so. Try to resist the temptation to use right aileron as too much at low speed will stall the wing.

• Landing

The Lyka Jet is really slippery, so give it plenty of time to slow down. Landings will be a bit nose-high and as slow and stable as any sport plane. I have seen no tendency for the model to tip stall. I usually fly at low rates, but I do kick on high-rate elevator on landings. Landings on short grass give a slide of about 25 feet.

• High-speed performance

High-speed performance is what the Lyka Jet is all about. With a piped .45 and a 9x9 prop, the Lyka Jet will accelerate very quickly, so be prepared. High-speed flight is smooth, stable and predictable, but you must be thinking ahead of it. Throttle management is recommended, as dive speeds may exceed 180mph. Smooth control inputs add to the jet realism. Consider a contrasting color scheme for the top and bottom as the speed does not allow much time to figure out which side is up.



A PERFORMANCE CHALLENGE

For those interested in the Lyka Jet's performance, here are a few benchmarks.

HIGH SPEED
(avg., 3 up, 3 down wind passes):
161.32mph
Charles Watt
Shrewsbury, MA
August 1995

Speed runs were timed by marking 1/20 mile (264 feet) on the runway and stationing a timer with a flag and a digital chronometer at either end. Start the chrono when the flag drops at one end and stop it when the plane crosses the other end of the trap. A little work with a calculator will give you a table to turn trap time into mph.

VERTICAL ROLLS
14
Jack Zimmanck
Marlborough, MA
May 1996

SUSTAINED KNIFE EDGE
7.46 seconds
Mike Mirabillio
Southbury, CT
July 1995

• Low-speed performance

Flying the Lyka Jet around at sport-plane speed is like pulling a plow with a thoroughbred. It can be done, but why would you want to? At low speed, the Lyka Jet is stable and controllable but, due to the short coupling, loses a bit of its grace. Some "slide" may be observed on tight maneuvers. A very lightly built Lyka Jet with a .25 or a .32 engine may prove to be a good low-speed performer.

• Aerobatics

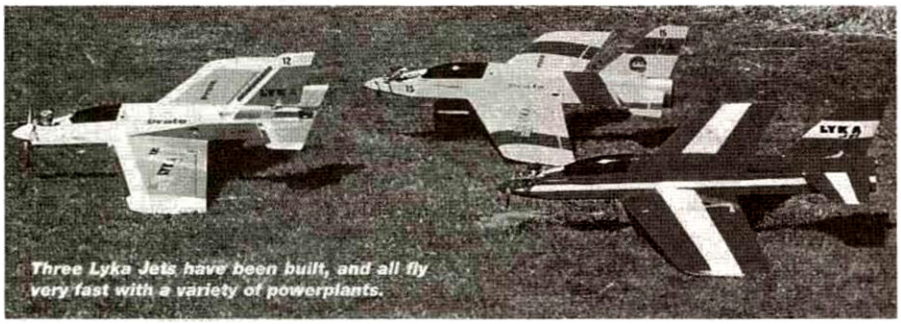
Wall-to-wall knife-edges, 500-foot loops, unlimited vertical rolls, 150mph passes, 1/4-mile-long four-points—all with the grace and smoothness of the best pattern plane. The Lyka Jet has exceptionally good manners for an airplane with such a wide performance envelope.

• Durability

The first three Lyka Jets are all still flying after two years and hundreds of blistering flights. The PVC fuselage and wire skid absorb most of the landing shock. No wing damage, other than a few holes in the covering has been sustained in normal flying from grass fields. Even though the airplane is very durable, careful maintenance of the airframe should be practiced to help avert dangerous mishaps.

CONTROL AND BALANCE

Control throws are very important. A transmitter with dual rates is a plus but not a necessity. Set single-rate transmitters to the low rate setup (below) and adjust from there as you get used to the airplane. For dual rates, set high rate elevator and aileron throws for ½ inch up and down. Low rates are 5/16 inch (50 to 55 percent dual rate on a computer transmitter). The rudder throws are 1¼ inches left and right on high rate and 1 inch on low rate. If you have exponential control, start at 30 to 36 percent exponential on both high and low on all controls. I have found no need for aileron differential. CG is 5½ inches from the leading edge.



Three Lyka Jets have been built, and all fly very fast with a variety of powerplants.

Above: Here you see the tail section removed. Under the stab are the throttle and elevator servos and the receiver.

Set up as indicated, the Lyka Jet is a great flying sport model that will satisfy anyone's need for speed. Once you've flown yours, why not drop me an email at **76461.3027@compuserve.com** and let me know how your Lyka Jet performs.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

SR Late breaking news...

By now, most of you have heard about *Techniques*. However, you may not have heard all of the details or what *Techniques* can do for your modeling.

Techniques is a new concept. With *Techniques*, you can easily build your own personal modeling library suited to your personal needs and interests. The basic idea behind *Techniques* is that after reading a volume, you should be able to do something you weren't able to do before reading it. It's that simple. Each volume is so jam-packed with information that if a paragraph were left out, you'd be missing something. No fluff, no bull, just pure "how to" information. If you'd like to be a better builder, finisher, or flyer, *Techniques* is for you.

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Each Volume of *Techniques* is only $3 including First Class postage to your home. If you'd rather subscribe to *Techniques* for the year so that you get each new volume as it comes out rather than trying to remember to order them periodically, it's no problem. *R/C Techniques* is published on the even months of the year, February, April, June, August, October, and December. *Electric Flight Techniques* is published on the odd months of the year, January, March, May, July, September, and November. A calendar year's subscription to six volumes of either *R/C Techniques* or *Electric Flight Techniques* for 1997 is $15 including First Class Postage. For 1998, a full year's subscription will be $18.

If you subscribe to either editions of *Techniques* at some mid point in the year, you'll receive all of the volumes which have already been published since January of the current calendar year.

Here is some of what's available in the ***R/C Techniques*** archive...

Volume R-1: Rx/Tx Battery Pack Testing

- How can you know how much flying time you will get from a receiver or transmitter battery pack?
- How can you determine the capacity of an older receiver or transmitter pack?
- What is "critical cutoff voltage?"
- Won't your Expanded Scale Voltmeter tell you how much charge is in your pack?
- Is there a way to make an ESV more accurate?
- If you know the capacity of a pack, how can you know how much flying time you will get?
- Is there a more precise way to calculate the average current draw of your system?
- How can you tell if you're using a large enough receiver battery pack?
- How can you tell if you're using the right charge rate for trickle charging?
- How can you tell how much charge your Fast Field charger is putting into your receiver and transmitter packs?
- Will the charger that came with your radio charge a five cell receiver pack properly?
- How does outside air temperature affect the capacity of your receiver and transmitter packs?
- How can you determine if your receiver pack was damaged in a crash?
- How can you tell in the Spring if your packs are ready for the coming flying season?
- Can you still use a pack that's five years old?
- Does a bad reading on a cycler mean you have a bad pack?
- How can a cycler cost you an aircraft?

Volume R-2: Rx/Tx Battery Pack Charging

- How long should I charge my receiver and transmitter packs?
- You said 10% for 14 to 16 hours. Why isn't it 10% for 10 hour? Isn't that 100%?
- What does "ma" and "mah" mean?
- At what rate does the standard charger that came with my radio charge?
- All of this is fine for a 500mah pack but my radio didn't come with a 500mah pack. It came with 700mah pack.
- How large a pack can be charged with the standard 50ma charger that came with my radio system?
- What about a 1500 mah pack? Can it be charged at 50ma too by lengthening the charge time to 36 hours or more?
- Why doesn't lengthening the charge time work?
- How critical is the timing? What if I forget and charge for longer than 14 to 16 hours?
- Does that mean that I can leave a pack on charge at the 10% rate all the time?
- With trickle charging the pack is on charge all the time. Why doesn't that hurt the pack?
- How long can I leave a pack on trickle charge and will it do any damage?
- Can a partially charged pack be trickle charged?
- Trickle charging sounds great. Where can I get a trickle charger?
- What about a pulsed or timed charge instead of a trickle charge?
- Can I just plug my charger into a timer?
- Can I charge a pack in less than 14 to 16 hours.?
- I notice that you cut 14 hours in half to get 7 hours rather than cutting 16 hour in half. Is there any reason you chose 7 hours?
- What about fast charging?
- I hear a lot about using a five cell receiver pack. What are the advantages of a five cell receiver pack?
- Can I use the charger that came with my radio system to charge a five cell pack?

Volume R-5: Everything you ever wanted to know about soldering. Part 1

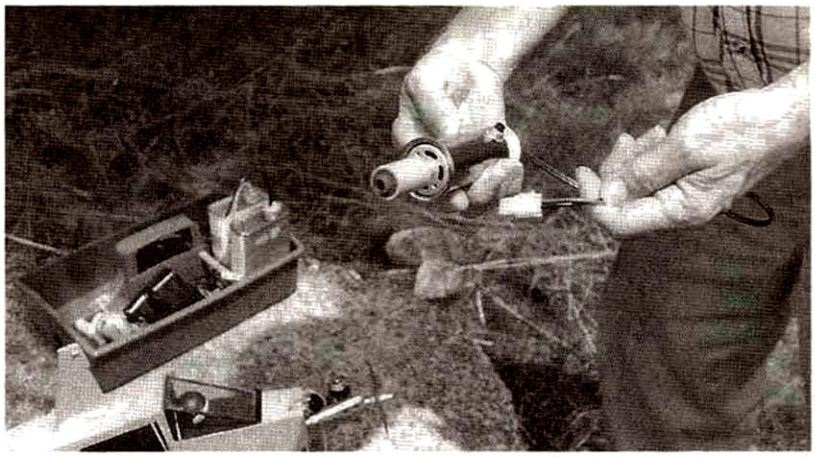
- What are the two most important factors to successful soldering?
- What are the warning signs that a wire might be hard or impossible to solder?
- What is flux?
- What forms does it come in?
- What's the difference between resin and rosin type fluxes?
- What kind of flux should never be used?
- Why should you use paste flux?
- What solder alloy should you use?
- What do the numbers 60/40 mean?
- When should you use silver solder?
- What sizes of solder should you use?
- What kind of soldering iron should never be used?
- What wattage or temperature soldering iron should you use?
- What size wire should be used for which applications?
- Is 12g wire bigger or smaller than 22g wire?
- How can you make your own holding fixture that's as good or better than anything you can buy?
- Where, when and how should you apply the heat from the soldering iron?
- How do you know when the soldering iron is hot enough?
- How do you keep the tip clean?
- What are the two simple soldering exercises that will make you an expert in no time?

If you'd like more information, just send us a SASE business size envelope with 55 cents postage to SR Batteries, Inc. Box 287 Bellport NY 11713. Email: 74167.751@compuserve.com Phone: 516-286-0079

MODEL AIRPLANE NEWS
HOW TO

Build a 1/2A Starter

by ROY L. CLOUGH JR.



PHOTOS BY ROY L. CLOUGH JR.

You'll need a 6- or 7-cell Ni-Cd battery to make the starter functional.

Low-cost convenience

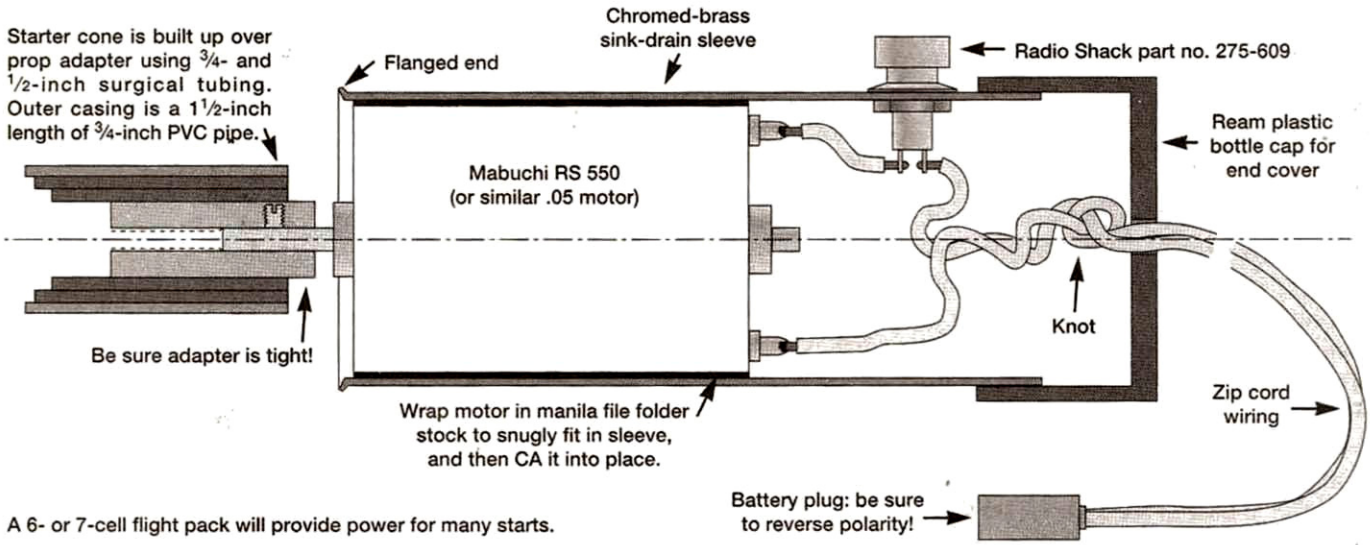
ANY USED Mabuchi 550 or Goldfire electric motor, a chromed-brass, sink-drain sleeve, push-button switch and odds and ends of tubing, PVC pipe and zip cord can be used to produce this neat electric starter for .049 to .09 engines.

Remove the flux ring from the motor and the prop screw from the adapter. Clean the motor casing and prop adapter with solvent. Build up the starter cone over the prop adapter with two layers of dry surgical (or other) rubber tubing. Pry the layers of tubing apart with a toothpick and drip in a few drops of thin CA. The outer casing of the starter chuck is a short length of 3/4-inch PVC pipe.

Drill a chrome-plated brass sleeve for a Radio Shack momentary-contact push-button. (Caution: thin wall tube can grab the drill and be twisted out of shape in a flash. Start with a 1/8-inch pilot hole, and bring it up to size with a succession of larger drill bits.) Slip the push-button into the hole, and hold the nut while you turn the switch body to tighten it. Solder one side of zip cord to one motor terminal and a 2-inch wire with a pre-stripped and tinned end to the other. Slide wiring and motor tail-first into the flanged end of the brass sleeve. Solder the motor wire to one side of the switch and the cord wire to the other. The clearance between the motor and the sleeve i.d. is taken up by rolled-up, manila, file-folder stock. Cut this stock long enough to insulate the wires from the case. When the motor fits snugly, lock it in place with small drips of thin CA at several points. The end plug is a plastic bottle cap. Attach your choice of battery connector with *reversed* polarity. Use a 5- to 7-cell sub-C pack.

If used intelligently, this starter will not damage .049 engines. Avoid hydraulic lockup, i.e., forcing the engine to spin against heavy flooding, as this might bend a rod. Prime the engine with a drop or two of fuel, and flip the prop a couple of times by hand before you attach the glow-plug clip and apply the starter.

Starting your small engines couldn't be easier.



A 6- or 7-cell flight pack will provide power for many starts.

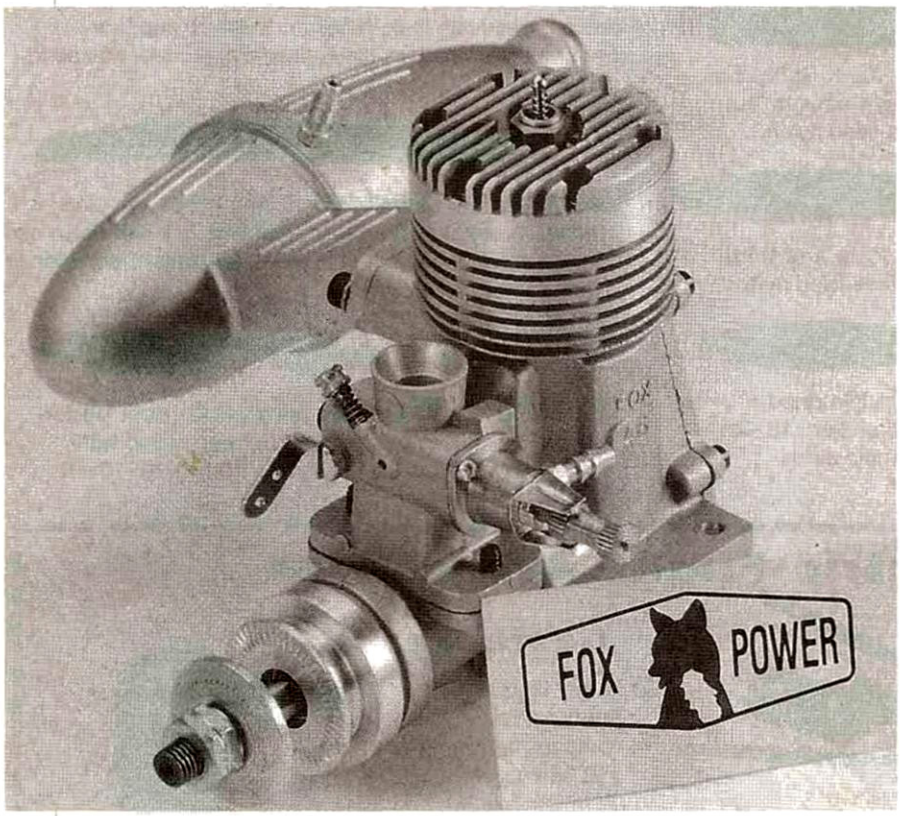
by DAVE GIERKE

FOX .46 BB ABC

IN MY MIND'S EYE, I can still see an advertisement from a 1953 issue of *Model Airplane News:* "The Fox .35 powered more stunt winners last year than all other makes combined! ... Flown by America's outstanding modelers—Bob Palmer, Harold deBolt, Lou Andrews, George Aldridge ...."

My first new engine was a Fox .35 Stunt. It took months of saving from my 50¢-a-week allowance and neighborhood grass-cutting jobs to purchase that gem, but "Shaney," the local hobby-shop owner, helped; he gave me a $1 trade-in allowance for each of the three spark-ignition-era engines that I'd acquired from one of my dad's friends. I remember these mostly because they didn't run. There was a Drone diesel (where's the plug?), a Bullet .27 (how do you keep the fuel from running out of the updraft carburetor?), and an Ohlsson .23 side-port (weak compression). A great deal! Now I only had to raise $11.95 more of the $14.95 price, and the Fox was mine!

Model Airplane News has published 62 reviews of Fox engines since 1951. Some of these engines have represented mileposts in the evolution of the design, manufacturing technique and performance of miniature 2-stroke cycle engines (see sidebar, "Fifty Years of Fox Engines"). As I examined the latest offering from the Fort Smith, AR, manufacturer, I reminisced about the technology that made Fox engines unique:



There's no mistaking this manufacturer; from its unique carburetor mount, large rear cover and easy-to-mount Tilt-Type Muffler, it's distinctively Fox!

PHOTOS BY DAVID C. GIERKE

• **One-piece crankcase.** Although not the first to have it, the 1949 Fox Stunt .35 broke with tradition by having its crankcase extend to the cylinder head. Using a drop-in sleeve, Fox proved that this technique could provide performance and economy of manufacture.

• **Extended back plate.** Pioneered in 1975 by the Fox .40 R/C, the conventional back-plate casting is extended to the cylinder cooling fins, exposing the rear of the cylinder-sleeve and rear transfer port. This technique allows effective coring for permanent-mold casting of the Schnuerle-type transfer and boost-port passages, without resorting to the prohibitively expensive investment-casting method.

• **Flange-type carburetor mount.** Pioneered in '68 and '69 on the Fox .60, .74 and .78, this method solved the air-leak problem Fox encountered with conventional O-ring sealed carburetor-to-front-housing interfaces.

WHAT'S IN THE BOX?

Fox has the best packaging system in the industry. The engine and muffler are surrounded by soft foam, contour-cut for maximum protection during shipping and handling. Each engine has a sticker attached to the propeller shaft indicating that the unit has been inspected, run and approved for sale, and the name of the inspector is included for reference.

This example of Fox production expertise has .46ci displacement; beam-mount, front-rotary-shaft induction; side-exhaust; Schnuerle with boost-port scavenging; ABC piston and cylinder; twin ball-bearing-supported crankshaft; and an air-bleed-type R/C carburetor with standard tilt-muffler.

ENGINE CONSTRUCTION/ DESIGN ANALYSIS

Designers establish goals concerning an engine's application, performance and cost. These are followed with specific objectives related to the many systems, components and fabrication techniques associated with its production. Literally thousands of decisions must be made on every aspect of the engine's creation. To the casual observer, many contemporary engines appear to have been cast from the same mold. Although some manufac-

turers cut corners by copying the success of others, there are significant differences—some subtle, some not.

From my perspective, the goals for the Fox .46 were to produce a durable sport/scale engine for muffler-equipped (non-piped) applications; to generate high torque at low rpm to turn relatively large propellers quietly; and to market a high-quality, moderately priced engine.

• Piston and cylinder sleeve. True ABC construction (chromed bar-stock brass sleeve with a cast, high-silicon-content aluminum-alloy piston). The sleeve has two Schnuerle transfer ports with interposed exhaust and boost port. Using a standard four-port arrangement, the transfers are steeply angled away from the exhaust, while the boost-port is machined to direct its mixture toward the head.

The baffle-less piston retains the wristpin with two music wire retainer-clips riding in shallow grooves within the wristpin hole.

• Timing decisions. By using a timing wheel mounted on the engine's crankshaft and aligned with TDC (top dead center), I was able to measure port opening and closing points relative to crankshaft rotation in degrees (see timing diagram); the descending piston of the Fox .46 opened the exhaust port 18° before the main transfer ports, and 20° before the boost port. To those of us who measure and analyze such things, this was unusual. The extended exhaust-lead (exhaust opening preceding transfer opening, in degrees of crankshaft rotation) provides a generous blow-down period (exhaust gases exiting the engine) prior to admitting cool, fresh, air/fuel mixture into the cylinder. Although this technique minimizes contamination of the fresh charge with exhaust gases, it demands retribution from the power and transfer periods; the exhaust port could be opened early, or the transfer ports opened later ... or both. The former ends the power event early, while the latter limits the transfer potential. In this instance, I believe both were altered.

Fortunately, crankcase compression is strong. Produced from induction valve closure (48° ATDC) to transfer port opening (57° BBDC), superior compression is generated from 75° of crankshaft rotation (180° – 48° – 57° = 75°). Given adequate time to fill the cylinder through relatively small ports, the engine generates high mixture velocities and good cylinder filling, if rpm are kept in the low-to-moderate range.

The combination of these timing manipulations with low to moderate speeds should produce high mean cylinder pressures and torque at the crankshaft. However, if propeller load is reduced (less pitch and/or diameter), allowing the engine to speed up, torque and horsepower will decline dramatically; it was designed that way.

• Tuned pipe. These usually require port timing with exaggerated exhaust lead to scavenge the cylinder of its contents. By design, a properly configured pipe generates a strong partial vacuum at the face of the piston, just as the piston opens the exhaust port, acting diametrically opposite to the action of a supercharger. This "pulls" spent gases out of the cylinder. As the piston continues its travel and the transfer ports open, the fresh mixture is also influenced by the negative pressure, helping move it into the cylinder. There's more to the operation of the tuned pipe, however; the results include improved scavenge efficiency, torque and power.

ENGINE SPECIFICATIONS

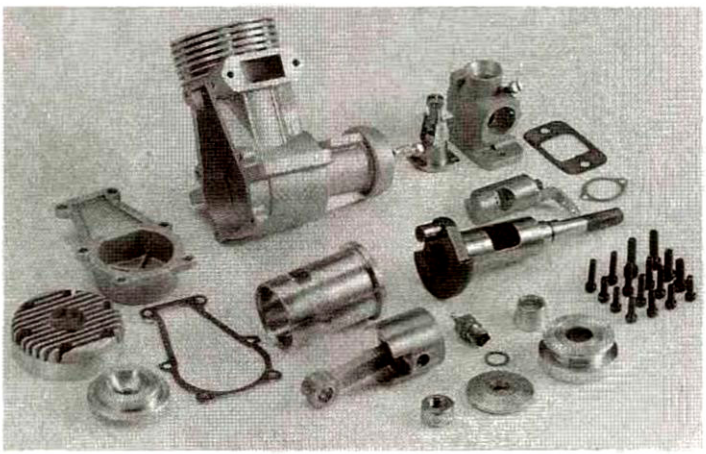
Displacement (calculated):	0.467
Stroke (measured):	0.792
Bore (measured):	0.866
Stroke/bore:	0.915/1
Compression ratio (geometric):	9.9/1
Compression ratio (effective):	7.54/1
Engine height:	3.875 in.
Engine width:	2.250 in.
Engine length:	4.125 in.
Width between bearers:	1.4375 in.
Mounting hole dimensions:	
Side to side:	1.875 in.
Front to back:	0.875 in.
Weight:	
Bare:	12.98 oz.
Muffler (std.):	2.43 oz.
Total:	15.41 oz.
Carburetor choke dia.:	0.325 in.
Crankshaft thread size:	¼-28
List price:	$117.99 (with muffler)

Features: .46ci displacement; beam-mount, front-rotary-shaft induction; side exhaust; Schnuerle with boost-port scavenging; ABC piston and cylinder; twin ball-bearing-supported crankshaft; and an air-bleed-type R/C carburetor with standard tilt-muffler.

Comments: versatile and easy-to-use, the Fox .46 BB ABC is a quality, American-made engine that performs splendidly and sells at a competitive price.

Hits
- Handles and runs well; a very user-friendly design.
- A surprising capability to turn large propellers at relatively low rpm while developing excellent high-speed performance with lighter loads. Able to fly a variety of model types and sizes.
- A state-of-the-art design with out-of-the-rut appearance.
- Excellent support information.
- Fox E-Z carburetor.

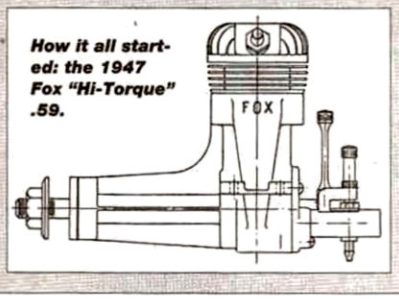
Misses
- Phillips-head machine screws on cylinder head, rear cover and carburetor. Allen capscrews would both function and look better.
- Rough appearance of permanent-mold castings.
- Inability to use certain test stands with Fox tilt-down mufflers.



Component parts of the Fox .46 BB ABC—first-class workmanship throughout!

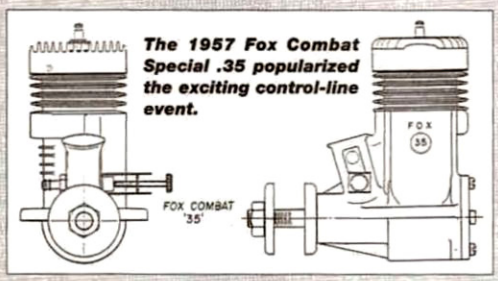
FIFTY YEARS OF FOX ENGINES

After Ray Arden's glow plug was demonstrated with great success at the 1947 nationals, it didn't take modelers long to appreciate its simplicity and reliability when compared to the spark-ignition system. Although some spark-ignition engines ran fine with a glow plug installed, others didn't. Glow-plug-equipped engines required methyl-alcohol fuels to operate properly and, because most "sparkers" ran on gasoline, problems developed.



How it all started: the 1947 Fox "Hi-Torque" .59.

The new plug and fuel caused catastrophic damage to several spark-ignition engine designs, including the industry leader, Ohlsson. Ohlsson engines featured an integral cylinder and head machined of alloy steel. This finned unit was "staked" to the aluminum-alloy crankcase by a unique spot-welding process, which worked satisfactorily with gasoline but not with glow fuel. Occasionally, Ohlsson engines "blew their tops" when running on glow fuel. As a 13-year-old, I had this unnerving experience with an Ohlsson .29 front rotary glow; we found the cylinder over a hundred feet away! The word got around quickly: don't stand in the line of fire when running an Ohlsson on alcohol!



The 1957 Fox Combat Special .35 popularized the exciting control-line event.

Many sparkers lacked sufficient carburetor spray-bar volume to pass minimum quantities of the new fuel and were undeservedly condemned as unsatisfactory candidates for conversion to glow. Needle-valve assemblies that did have the capacity often frustrated operators with methanol's lack of economy; it required almost three times the fluid volume of gasoline to equal its run time.

The destruction of plastic fuel tanks attached to the rear of most spark-ignition engines was possibly the most galling circumstance of all. As modelers filled these tanks (intended for gasoline) with glow fuel, they watched in horror as the tank became distorted and turned to mush within seconds.

Eventually, engines were designed specifically for glow plugs and alcohol fuel. However, as with any paradigm shift, the modeling public needed an education on how to use the new technology.

About this time ('47), the Claude C. Slate Company of Los Angeles introduced their sleek-looking, lightweight, .60-class engine called the Fox "Hi-Torque" .59. It had a long, thin crankshaft supported by twin ball bearings, rear-rotary disk induction and spark ignition. Like everyone else, its young designer, Duke Fox, was caught off guard by Arden's bombshell. Although the engine performed magnificently, it was produced at the wrong time and turned out to be the wrong size. The sensational glow-plug-inspired "baby engines"

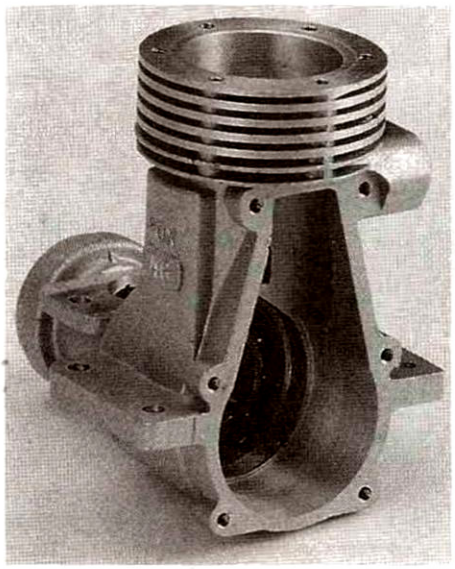
Tuned exhaust systems require the engine to be operated within a relatively narrow rpm range, which limits propeller selection—restrictions the novice flier should avoid. (Shortly before submitting this review, I had the pleasure of speaking with chief engineer Charles Thacker, who designed the engine. He confirmed that the .46 BB ABC was intended to operate on either a muffler or tuned pipe, which clarifies the exhaust-lead question.)

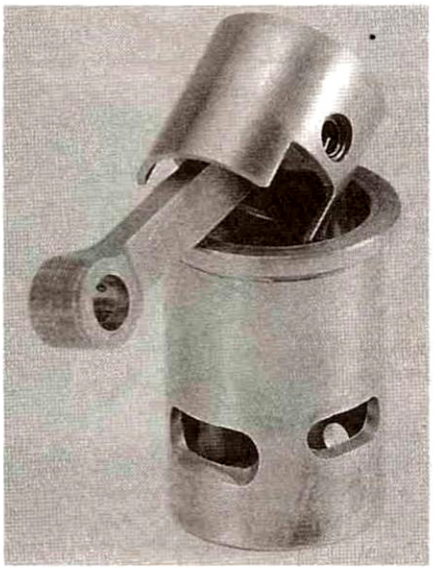
An interesting alternative explanation to the early opening of the .46's exhaust port was advanced by 2-stroke engine authority, Luke Roy: "... since the engine was designed to use a muffler, there's going to be some backpressure at the port. Even though the exhaust port appears to open early for a low-rpm/high-torque design, blowdown will actually be delayed. Because of this," he continued, "the engine acts as if it has a longer power event, and a shorter exhaust duration. With a tuned pipe, backpressure is minimized, allowing blowdown to commence as the piston uncovers the port." (Thanks, professor.)

• **Crankcase, rear cover and carburetor body.** Permanent-mold cast-aluminum alloy with bead-blast surface finish. Cylinder fins are machined, producing a reflective contrast to the satin-gray primary finish.

• **Cylinder head.** This consists of two parts. The retainer is permanent-mold cast from aluminum alloy. It has six drilled holes for attachment to the crankcase with 4-40x0.500-inch Phillips-head machine screws. The button insert is fabricated of bar-stock aluminum. It has a hemispherical combustion chamber surrounded by a standard squish-band face.

• **Thrust-washer.** The aluminum bar-stock unit uses the popular and efficient split-collet system (aluminum) for locking itself and the inner race of the front ball bearing to the crankshaft. This





Left: the most distinguishing outward feature of the engine is its expanded rear cover. Casting considerations led to this unique solution to a difficult problem. Right: the piston and bushed connecting-rod assembly with its wear-saving press-fit wristpin. True ABC construction features flawless chrome application and honing.

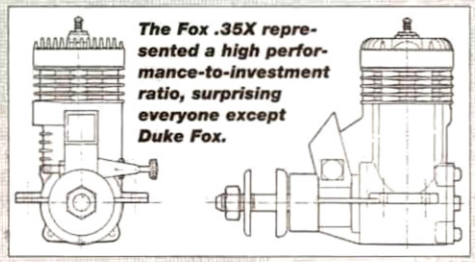
were about to be marketed by K&B (Infant .020), Anderson (Baby Spitfire .045) and Herkimer (OK Cub .049). Nevertheless, the modeling press praised Fox for his masterpiece and its companion, the "Hi-Speed," but sales were disappointing during this period of upheaval and change.

Fox, like many others in the industry, was astounded by the astronomical sales generated by these tiny engines. By talking with local modelers and reading the magazines, he carefully analyzed the postwar market. One thing was certain: the trend was toward smaller models that would fit into the family car so the wife and kids could tag along to the flying field. However, rather than try to gain a share of the 1/2A frenzy, Fox decided to explore the middle-size engine market.

After leaving the Slate Company, Fox joined forces with another modeler, forming the Arnold & Fox Engineering Co. and locating their manufacturing facility in North Hollywood, CA. In 1949, the Fox .35 Stunt engine was born. Arguably the most famous and recognizable engine of all time (with the possible exception of the Cox Baby Bee .049), the Stunt .35 is still produced today, almost 50 years later. Here's what former *Model Airplane News* engine columnist Peter Chinn had to say about the engine in his June '67 review: "There are other .35's as powerful; however, none are as light or compact ... few perform with such reliability and consistency."

Although dozens of engine designs have been manufactured by Fox over the past five decades, to this columnist the milestones are represented by the following:

• 1947—Fox "Hi-Torque" .59.



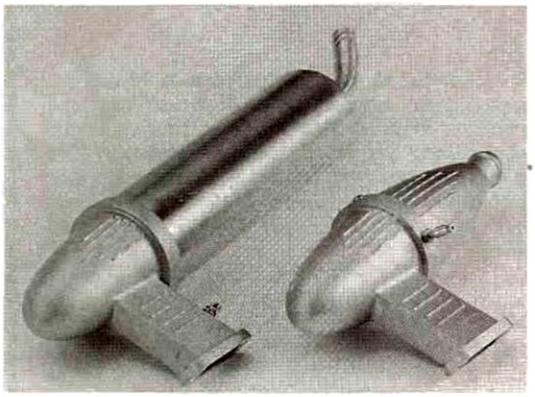
The Fox .35X represented a high performance-to-investment ratio, surprising everyone except Duke Fox.

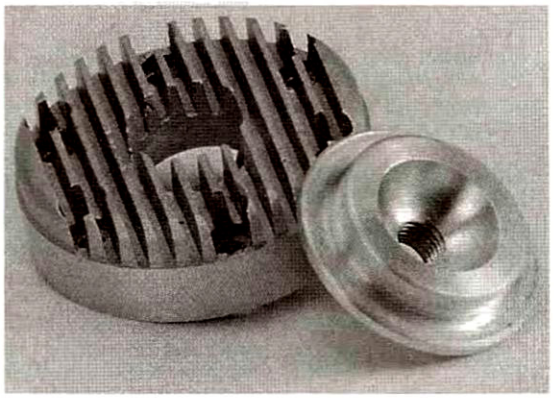
• 1949—Fox .35 Stunt.

• 1956—Fox .29R. Known to collectors as "the bathtub intake .29," this control-line speed engine was designed to operate on high percentages of nitromethane above 20,000rpm while producing almost one brake-horsepower—very high for the period. A unique-looking engine, it featured a long, large-diameter crankshaft supported by a single ball bearing at its rear. Manufactured in two versions—a single glow-plug head and a twin-plug unit—it also sported a rear-mounted needle-valve assembly.

• 1957—Fox .35 Black Head Combat Special. When I replaced my Fox .35 Stunt with the new "black head" Combat Special on my Riley Wooten-designed "Quicker" control-line combat model, I was initially shocked by its unrelenting power. The combination generated speeds in excess of 110mph, and the airplane didn't seem to slow down in maneuvers. Operating on Fox "Missile Mist" fuel (16 percent nitromethane, 8 percent nitroethane, 17 percent castor oil), and crankcase pressure (metal tank), the thing was pure fun—especially when flying against a competitor with similar equipment!

• 1962—Fox .35X (Blue Ribbon .35). Originally intended as a low-priced alternative to the twin-needle-bearing Combat Special of '61, the "X" surprised everyone with its superior power. It differed from its predecessor by incorporating a one-piece crankcase with a single rear ball bearing supporting the crankshaft. The unusual-looking rectangular venturi and piston-cylinder technology were carried over from the C.S. design. The .35X was the basis for a whole new generation of high-performance Fox engines.





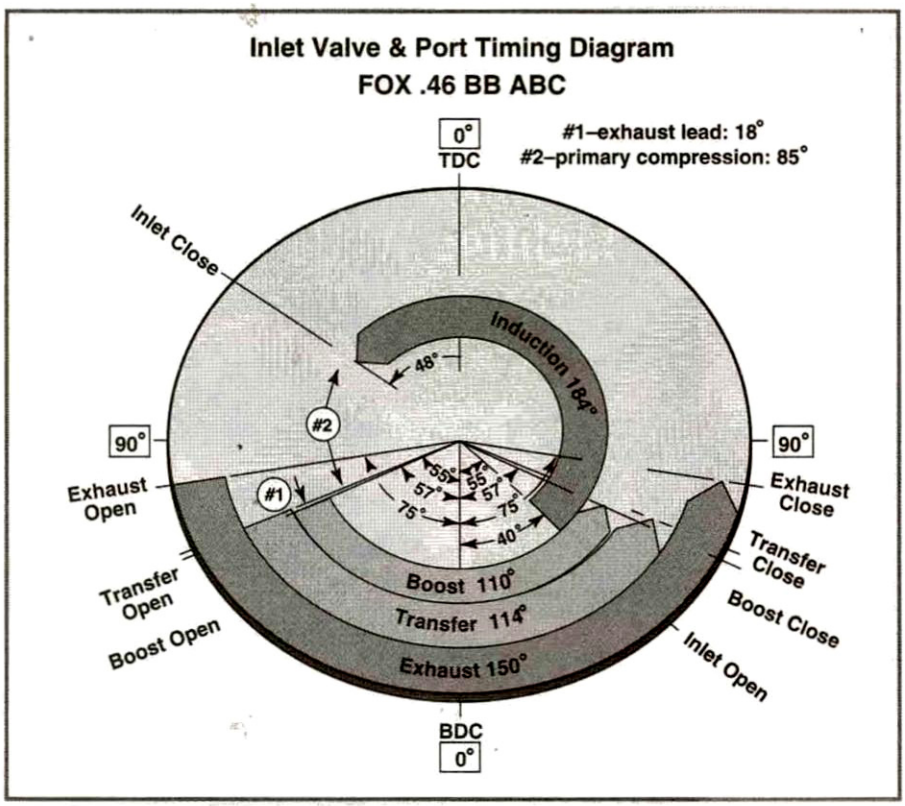
Left: the Standard Tilt-Down (or Tilt-Up) Muffler (right) uses simple expansion-chamber technology and proved to be quite loud. But the Fox Quiet Muffler (sold as an accessory) combines the best features of resonator and expansion-chamber designs, for impressive sound reduction and performance-enhancing characteristics. Right: the two-piece cylinder head consists of a button insert with a cast, finned retainer; the single-bubble, hemispherical combustion chamber is surrounded by a shallow-angle squish-band of standard configuration.

locking action limits the crankshaft movement (end play) to the clearances within the bearing ... an important feature when an electric starter is forced against the end of the crankshaft and tries to drive it out through the rear of the engine!

• **Crankshaft and ball bearings.** Fabricated of a single piece of alloy steel, the unit was case-hardened and ground to size. The precision of this operation was demonstrated when its two ball bearings exhibited a perfect light interference fit onto the crankshaft journals.

• **Connecting rod/wristpin.** The connecting rod is machined of aluminum-alloy bar stock, with bronze bushings press-fit at both ends. The wristpin is machined of alloy steel that had been lightened by drilling an end-to-end hole. Case-hardening is followed by precision grinding of its outside diameter.

The pin is press-fit (light to moderately) into the piston before the music-wire keepers are installed. By not allowing the pin to "float" in the piston, two very difficult lubrication points have been eliminated. Floating-pin designs (0.0002 inch ± 0.0001 inch) must maintain continual and adequate lubrication to prevent unacceptable wear. Unfortunately, a single lean run can generate wristpin-boss temperatures high enough to break down the best natural or synthetic lubricant. The resulting friction quickly enlarges the wristpin hole. The Fox .46 doesn't have this problem. The trade-off, however, concerns disassembly and re-assembly of the unit. A precision piston-holding fixture is an absolute necessity, along with a force-multiplying press, fitted with a pin-removal/insertion mandrel. This is a job best suited for the factory.



ENGINE OPERATION

Problems with mounting Fox's unique tilt-down muffler prevented its use with my all-aluminum test stand from Sheldon Engineering. In its place, I used the highly regarded Davis Soundmaster unit.

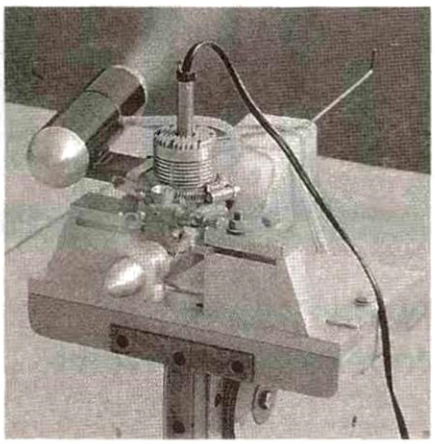
For break-in, I used a Zinger 10x6 propeller with 15 percent nitromethane fuel (by volume), containing 20 percent lubrication (10 percent Klotz KL-200 synthetic and 10 percent Klotz racing castor oil). The remainder of the blend consists of methyl alcohol.

As with all ABC-type engines, the break-in fuel should always be the same as the flying fuel. As discussed in previous columns, the piston and cylinder fit is determined primarily by established operational temperatures; different fuel compositions produce varied component temperatures.

After ten 3-minute runs (always 2-cycling, rich-lean-rich, etc.), the engine held a peaked needle-valve setting of 13,800rpm.

Next, a variety of sport-plane APC propellers were run to provide comparative rpm numbers against engines of similar displacement and design configuration:

SIZE	RPM
9.5x8	15,300
10x6	14,100
10x7	13,000
11x6	12,300
11x8	11,900
10x9	11,500
12x6	10,200
12x8	8,800
11x10	8,600



Running on the test-stand during break-in. Notice the Davis muffler being used on the Sheldon all aluminum test stand.

I decided to use the APC 10x7 propeller to perform the sound tests and set the idle rpm of the carburetor. At the standard distance of 9 feet from the engine's crankshaft and 90° from the its centerline (on the exhaust side), the high-speed needle valve was peaked (13,000rpm); the sound meter indicated 94.5dB (Davis muffler).

Later, I mounted the engine to a Tatone test stand, which offered more space for the standard Fox tilt-down muffler and recorded 98dB. Although significantly louder, the standard Fox muffler allowed the engine to unload slightly more than the Soundmaster (13,200rpm). I was pleasantly surprised after testing the Fox Quiet Muffler; it produced only 93.5dB at 13,300rpm—clearly the best.

Using the same APC 10x7 flight propeller, I found the air-bleed type of carburetor very easy to adjust. Here's the procedure: after setting the high-speed needle to maximum rpm (minus about 200), retard the throttle to full idle. If the engine belches heavy smoke and raw fuel, it's too rich. Allow the engine to stall or advance the throttle rapidly. Puddles of fuel inside the crankcase (known as "loading") will usually flood the cylinder, extinguish the glow plug and stall the engine; if it doesn't, stop the engine manually by squeezing the fuel line. With the machinery safely at rest, open the idle-air adjustment screw one turn counterclockwise and try again.

Note: air-bleed carburetors are adjusted opposite to twin-needle, fuel-metered units. When the engine is rich, the secondary needle valve of a twin-needle carburetor is closed (clockwise). If the engine is lean, the secondary needle-valve of the twin-needle unit is opened.

After minimal adjustment, the Fox idled reliably at 2,700rpm. When the throttle was advanced rapidly to the high-speed stop, the engine responded crisply and instantaneously.

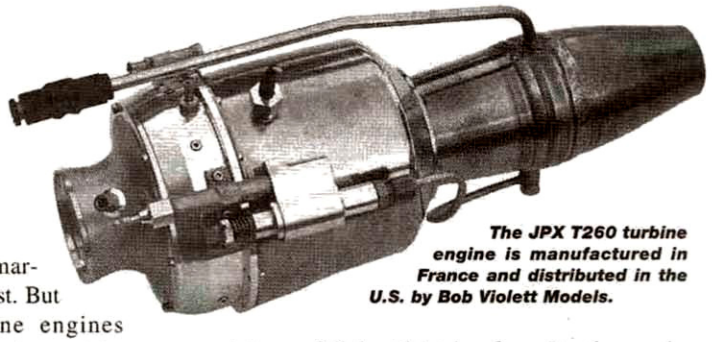
Be aware of one idiosyncrasy of all carburetors: after any secondary adjustment, always return to the high-speed needle and check the maximum rpm setting at wide-open-throttle; sometimes it changes. It's discouraging to fiddle with the idle adjustment to get it just right, only to discover that the high-speed setting has changed. Adjusting one side of the equation always changes the other.

CONCLUSION

Versatile and easy to use, the Fox .46 BB ABC is a high-quality, American-made engine that performs splendidly and sells for a competitive price. Although Duke Fox passed away in 1991 at the age of 71, the company continues to be ably managed by his wife and supported by a group of skilled and dedicated employees. ✚

by TERRY NITSCH

TURBINES AND RIVETS



The JPX T260 turbine engine is manufactured in France and distributed in the U.S. by Bob Violett Models.

BY WAY of introduction, my name is Terry Nitsch, and I have been involved in competitive scale modeling for 10 years. I've been flying R/C for 35 years, with the majority of my competition experience being in pattern and aerobatics. I've been a past national pattern champ, two-time scale champion and three-time winner at Top Gun and the U.S. Scale Masters. Having written several articles for *Model Airplane News*, I was asked by Bob Underwood if I would be interested in pinch hitting for him in "Scale Techniques" while he attends to important business with the AMA. How could I resist?

The model I competed with at the 1997 Top Gun Scale Invitational is this Lockheed P-80 Shooting Star. Built from a BVM kit, my P-80 is powered with a JPX turbine.

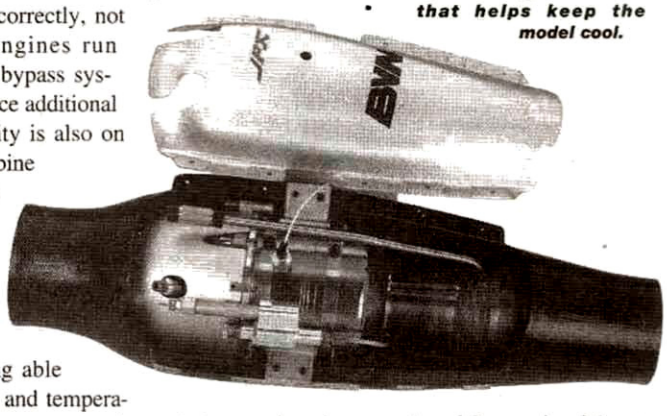
TURBINE TECHNOLOGY

Most of my scale experience has been with jet models, and with the recent introduction of gas turbine engines, flying jets is getting more exciting every day. In the recent Top Gun Scale Invitational, there were four turbine-powered jets in competition. My personal mount was an F-80C produced by Bob Violett Models*. The engine powering the F-80 was the JPX T-260, which is manufactured in France and distributed in the U.S. by BVM. This aircraft has a wingspan of 77 inches and weighs 19 pounds.

It appears to me that the modern trend in scale competition is for larger types of aircraft that usually weigh between 20 and 30 pounds. With a typical ducted-fan powerplant, the thrust-to-weight ratio of these larger models becomes marginal at best. But gas turbine engines enable scale jet modelers to move right up in size, and they produce that great sound that makes jet jocks' blood boil! These engines generate power and plenty of it! The AMA has a thrust limit of 10 kilos (22.3 pounds), and several of the turbine manufacturers have had to add controllers to their engines to keep the thrust below this limit. All this power does not come without a price.

Fuel consumption is high with the larger turbines, and some use as much as ½ gallon per flight, although the large-scale aircraft can accommodate this much fuel without a problem. Exhaust-gas temperatures can exceed 1,500 degrees, so much special care must be taken to insulate the inside of the model. Triple-wall tailpipes and multilayer ceramic-based isolation are not uncommon. Being developed by kit manufacturers are bypass systems that channel air around the engine to form a boundary layer around the internal periphery of the tailpipes to aid in the cooling process. When these systems are done correctly, not only do the engines run cooler, but the bypass systems also produce additional thrust. Reliability is also on the rise, and turbine manufacturers are developing onboard control systems that monitor engine functions. Being able to monitor rpm and temperature can prevent severe engine and aircraft damage in case of a system failure.

Here, the JPX engine is shown situated in a molded airflow bypass shroud that helps keep the model cool.



FLYING TURBINES

Flying turbine-powered models is also a different and interesting experience. In most cases, "spool-up time" (idle to full throttle) takes from 5 to 6 seconds, while spool-down time is slightly less. As you can imagine, landing a turbine model "on the numbers" can be quite a challenge. Aerobatic maneuvers are not more difficult with turbines; they're just different.

Throttle-ups naturally need to occur much earlier—usually before the turn-around maneuver has been completed. This sounds and looks much more scale-like than a burst of throttle at almost show center. Throttle-downs need to be at about the maneuver's midpoint; this is probably the most difficult thing to get used to. If you're too late pulling back the throttle, get ready for a pylon turn.

Ground-handling is also critical. Once the engine has been spooled up and the brakes released, you are almost at the point of no return. That spool-down time seems like an eternity if the model gets out of sorts on the takeoff roll. Turbine engines also produce between 1 and 2 pounds of thrust at idle; this also mandates the need for functional wheel brakes.

Full-scale jets rely on devices such as speed boards, slats and large flaps to take off and land safely. On turbine-powered models, these devices must

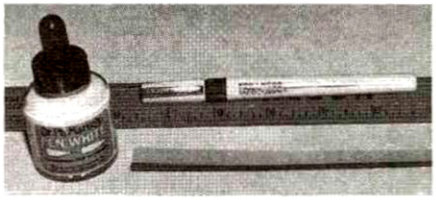
also be functional to reduce airspeed and create additional lift just like on the big boys. Our models now not only have to look like their full-scale counterparts, but they also have to act like them in almost every way. Isn't that what scale modeling is all about?

I'm sure in the not so distant future we will see miniature turbine-powered turboprop aircraft and helicopters. It just keeps getting better, doesn't it?

RIVETS—THE REST OF THE STORY

Many articles have been written on how to apply rivets to a model's surface. Riveting techniques have included burning them in with a tube and soldering iron, dry-transfer rub-on decals and applying small glue drops. I would like to focus on some of the techniques that will make the rivet job a little easier and make the "rivets" look a little better.

First, we need to have the proper tools to lay out the model's riveting lines accurately and neatly. Mine consist of an easy-to-read flexible ruler, a Rapidograph technical drawing pen and some Dr. Ph.Martin's Pen-White



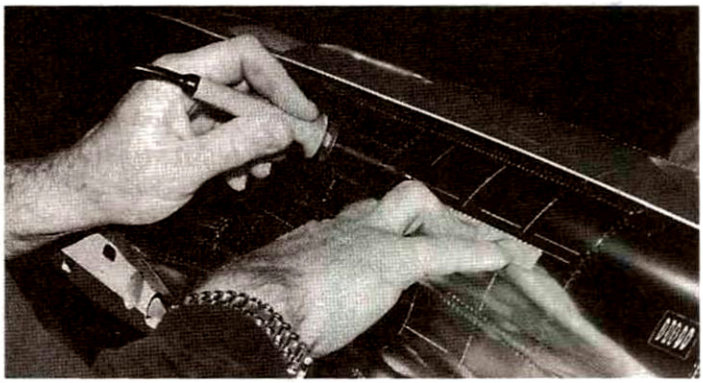
The supplies you'll need to lay out rivet and panel lines: a straightedge ruler, a flexible straightedge, a Rapidograph mechanical drafting pen and Dr. Ph.Martin's Pen-White ink.

drawing ink (available at art-supply stores). A narrow, flexible straightedge is also very important. I make my flexible straightedges from Flex Temp template material. With a good steel straightedge and a sharp hobby knife, trim an edge true, and then slice off a piece of the template material approximately ½-inch wide and about 12 inches long. A second piece about 4 inches long is good for getting into those hard-to-reach areas. Next, place two layers of ⅛-inch flexible masking tape about 1/16 inch from each edge. This tape will slightly elevate the straightedge from the model's surface and will prevent the ink from wicking under the straightedge when applied. Now, fill your pen with ink, and you're ready to start.

The next step is to lay out the rivet pattern or grid on the model's surface. If all the panels are already on the model, it seems pretty simple, but there are usually more rivets in the center and outside of

these panels than just around the periphery. Most of these rivet rows are parallel to some panel boundary or edge. Keeping these rows true to form, especially on fuselages with compound curves, can be quite a chore.

Working from the nose to the tail, lay out one area at a time. Dr. Ph.Martin's ink adheres well to any type of surface, and the beauty of this product is that it is water-soluble. If the layout doesn't appear to be correct, use some glass cleaner and a paper towel; the ink wipes right off. Now, apply your rivets using the method you prefer, right over the top of the ink lines. When the area is complete, remove the ink lines with glass cleaner. All you should have left are nicely placed rivets, true to the intended pattern. Continue area by area until the model is complete. This ink is also very helpful in placing simulated panels on a model. Just draw the panel position on the model's surface, apply the panel and remove the residual ink.



Here, I am applying flush rivets to my P-80 with a brass tube placed in a soldering pen. The use of the Dr. Ph.Martin's Pen-White ink greatly simplifies applying straight rivet lines. Once the rivets have been applied, the ink can be removed with a cloth and glass cleaner.

ALUMINUM RIVETS

I have been asked many times about how to get those realistic, metal-looking, raised rivet heads on simulated aluminum skin. There's a product that does an excellent job when mixed with Zap* Formula 560 adhesive. It's called Cres-lite Bronzing Powder. The type I have used is manufactured by Crescent Bronze Powder Co. It is also available at better art-supply stores. Just mix it with the Formula 560, and apply using the traditional glue-drop method. When mixed with the adhesive, it looks gray, but when the mixture has cured, the simulated rivets sparkle nicely.

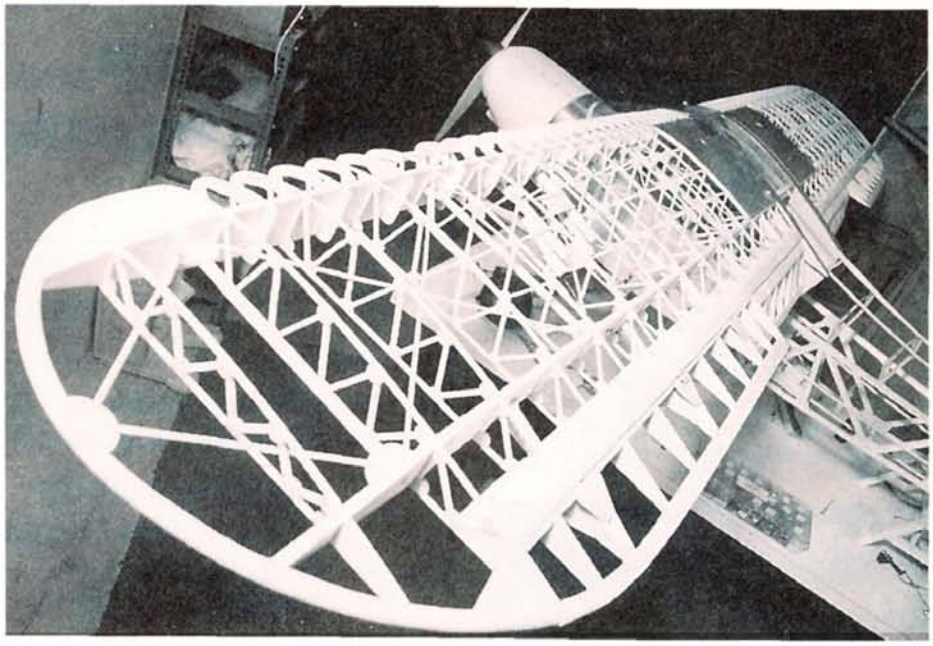
Riveting supplies: Pacer's* Formula 560 canopy glue, Cres-lite aluminum powder, some thin pinstriping tape and a syringe.

A good way to align these glue-drop rivets is with a piece of blue, 1/8-inch fine-line tape. Press the tape down lightly onto a piece of glass, then, using your trusty technical drawing pen, draw a line on the tape every 3/16 inch. You can now apply this strip of marked tape to your model and place a glue drop along the edge of the tape adjacent to the rivet lines; peel the tape up and move on to the next row.

To finish the job, obtain some dark gray drawing chalk and a stiff, narrow, short-bristle brush (once again at the art-supply store). Load the brush with the chalk and stroke the model's surface along the panels and rivets. This will give the rivets some dimension and make them appear much more realistic. Any excess chalk can be removed with a paper towel and a little glass cleaner to produce the desired effect. The model can now be clear-coated or lightly redone as needed. It's surprising how a little extra effort and a little help from the local art-supply store can make a big difference in enhancing the realism of our models.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

MODEL AIRPLANE NEWS
HOW TO



SEVERAL YEARS ago, I scratch-built a 1/3-scale Super Cub from Charles Richard Plans. The plans called for built-up ribs in the wings. This was my first scratch-building project, and I was a little unsure of whether or not I wanted to take on all that work. However, Charles had built a number of these Cubs; he had one on landing gear and one permanently on floats. Considering this, I decided to try my hand at building the wings exactly the way the plans called for. Well, to my surprise, it was not nearly as much work as I had anticipated!

Make Built-Up Truss Ribs

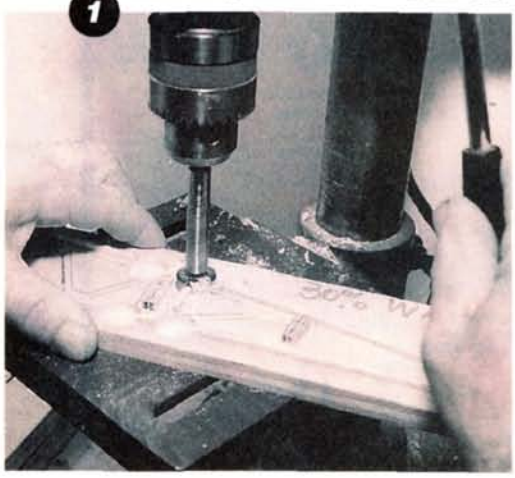
by GRAEME MEARS

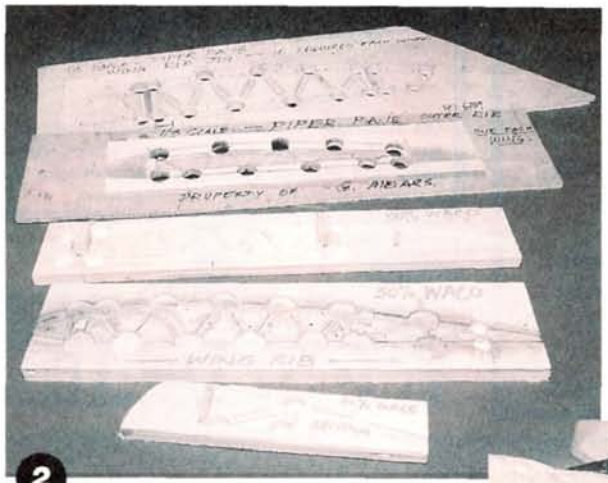
It's easier than you think!

You may ask, "Why go to this extra work?" First of all, you have a much stronger rib without adding weight. Then, once you have built all the ribs, the wing builds very quickly over solid spruce spars. A scale constructed wing is easy to straighten at any stage after construction by means of the cross-wiring. With the cross-wiring system, it was always a problem for me to get the wires through holes drilled in solid ribs; not so with truss ribs.

Preparation is very important if the construction process is to go efficiently. Currently, I am building a 30-percent-scale Waco UPF-7 biplane from my own plans. The only materials used in these ribs are 1/8-inch square spruce and 1/64-inch ply for gussets.

Working on jig, showing the gusset areas being relieved with a Forstner bit.



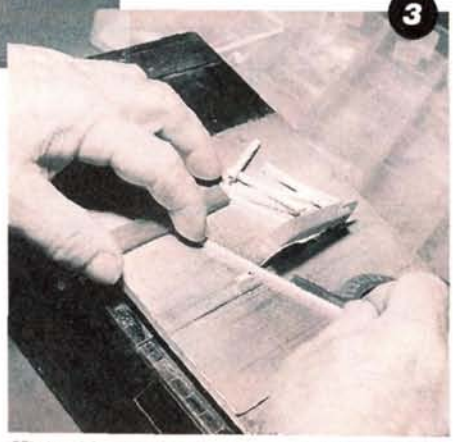


Various wing rib jigs for my 1/3-scale Super Cub and 30-percent Waco UPF-7.

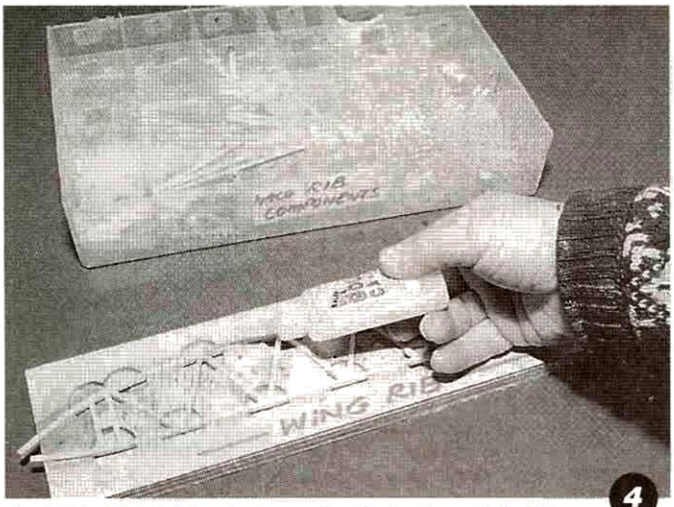
BUILDING A RIB JIG

I took a photocopy of the wing rib from the plans, and after checking that it was accurate in size to the plans, I stuck it to a piece of 3/32-inch aircraft plywood with 3M 77 spray adhesive. Then I used a scroll saw to cut very accurately around the outside rib line. I now have the inside and outside of the rib shape. The female (outer) piece is then glued to a flat piece of 1/2-inch plywood. The male (inner) part of the rib is then sanded back 1/8 inch to the inside line of the top and bottom capstrips on the power belt sander.

Next, cut out all the areas where the 1/8-inch square truss members will go. Number the parts as you do this because you end up with a jigsaw puzzle. With the aid of pieces of the 1/8-inch spruce as spacers, glue all the pieces of the puzzle onto the 1/2-inch plywood base. It's also necessary to have a small section of the front and rear spars glued into place at the correct locations. Now, to prevent the ribs from being glued to the

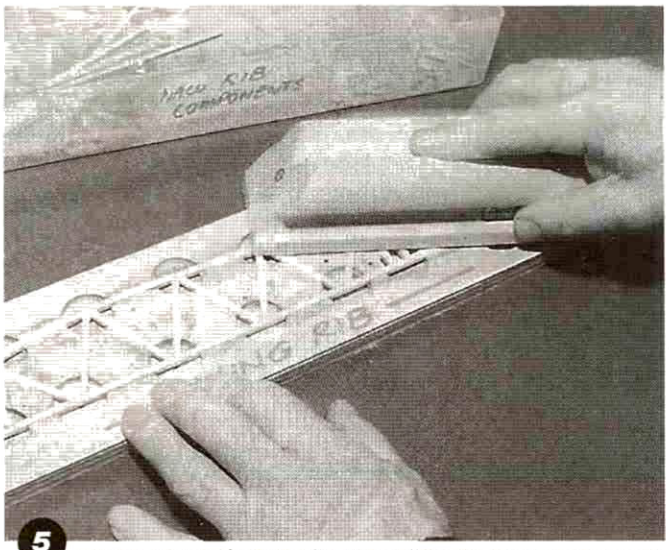


Mini table saw set to mass-produce wing-rib parts.



4

Apply thin CA to joints prior to sanding the top face of rib. Note the compartment box in background that holds all the components in order of application.



5

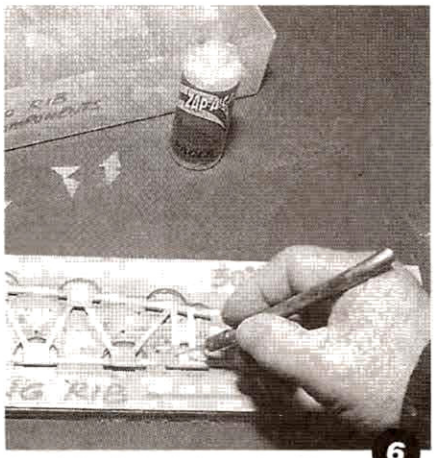
Sand the top face of rib prior to installing the first set of gussets.

jig as they are built, I relieve all the areas where there will be gussets with a Forstner bit (photo 1). Be careful that you don't take too much of the essential parts of the jig away at this stage. Now the jig is finished (photo 2).

PREPARING FOR CONSTRUCTION

I now make several of the individual components and catalogue them in a compartment tray. If you analyze the 1/64-inch ply gusset shapes carefully, you will find common dimensions, and you can generally cut long strips of the ply, then snip the pieces to size and shape in a paper guillotine set up with a gauging fence. Remember, these go on both sides of each rib, so make plenty!

I set up my mini table saw using the fence and miter guide to accurately mass-produce the 1/8-inch square spruce truss members (photo 3). I make about 40 at a time. The long, 1/8-inch square spruce capstrips will need to be soaked in water so the sharper curves (at the leading edge) can be made without breaking the strips. Now we are ready to make a rib.



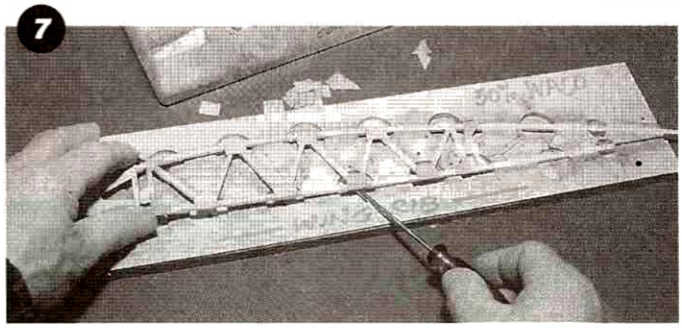
6

Attach the first set of gussets with medium CA.

CONSTRUCTING THE RIB

It is a very good idea to coat the jig with PVA (mold release) to help prevent the rib part from becoming glued to it. Next, place all the 1/8-inch square spruce parts in the jig, making sure that everything meets accurately and is flat. Apply a very small drop of thin CA to each joint (photo 4) to hold things together while you are sanding the top rib face (photo 5). With sanding complete, we can glue all the 1/64-inch ply gussets in place with medium CA (photo 6). Be careful to keep the CA off the jig! Carefully place a flat board on top of the rib, separated with waxed paper, and weigh the rib down. Leave it a few minutes to cure. When the glue has cured, remove the partially finished rib from the jig (photo 7). Now place the rib face down on a flat surface and sand the underside flat (photo 8A). When you are satisfied, add the rest of the gussets to the second face. When everything has fully cured, trim and sand the excess gusset material back to the capstrips (photo 8B).

You have just finished your



7

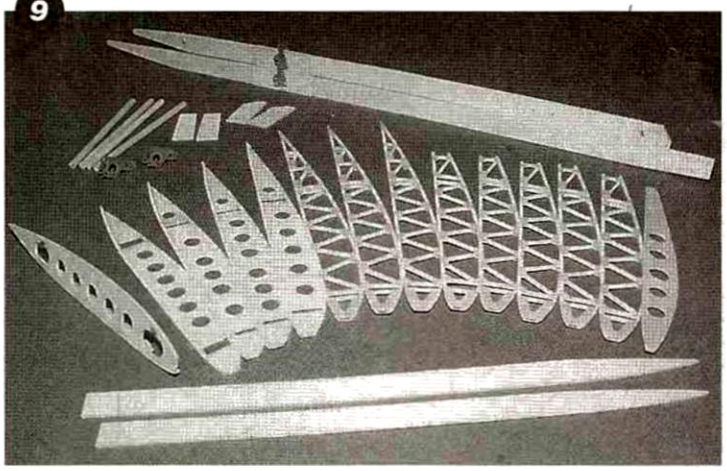
Carefully remove the partially finished rib from the jig using a small screwdriver.

8A **Sand the other side of rib with a sanding bar.**

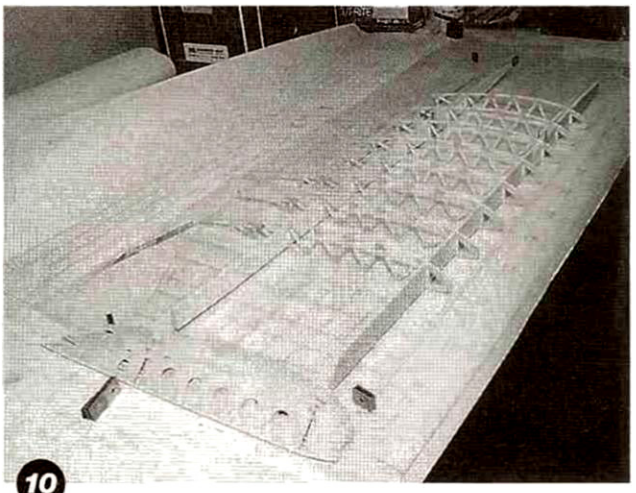
8B **Trim and sand to remove all excess gusset material.**

PHOTOS BY GRAEME MEARS

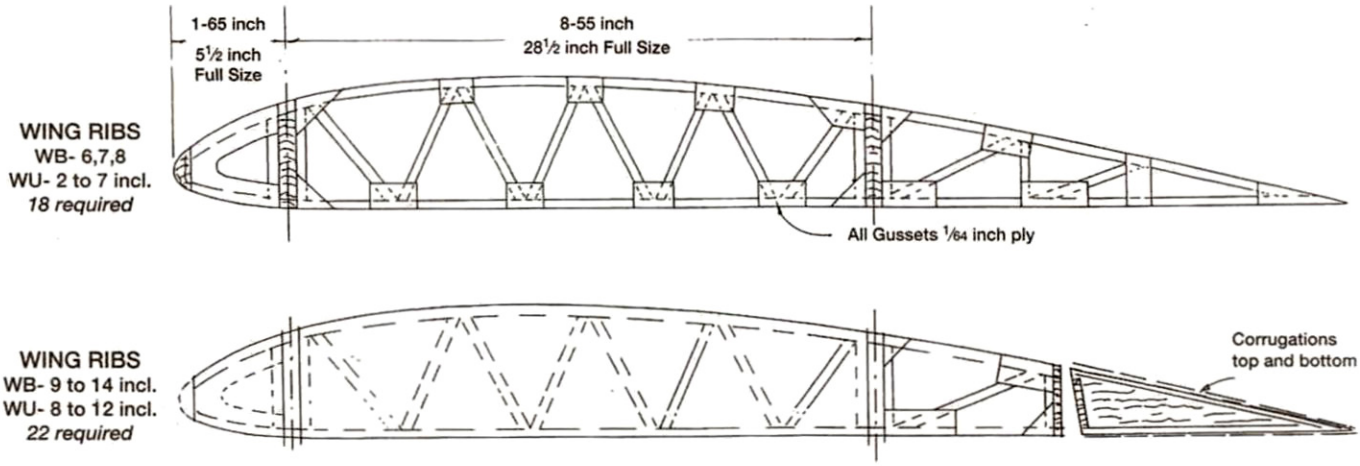
MAKE BUILT-UP TRUSS RIBS



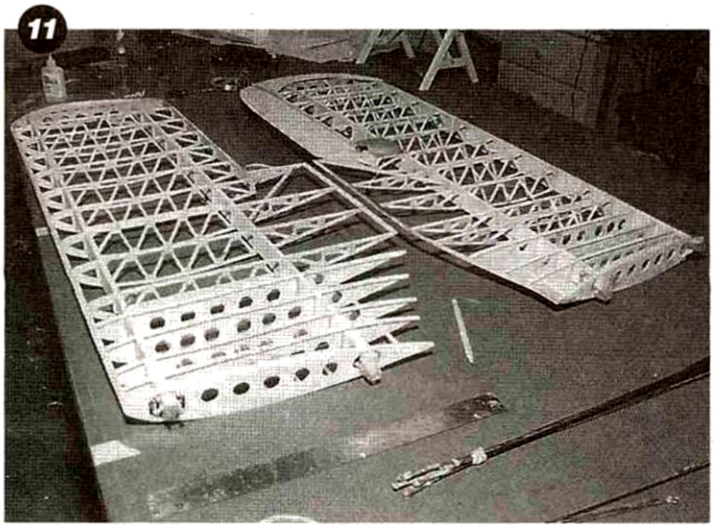
All of the completed ribs and other components that make up the bottom wing of the 30-percent Waco.



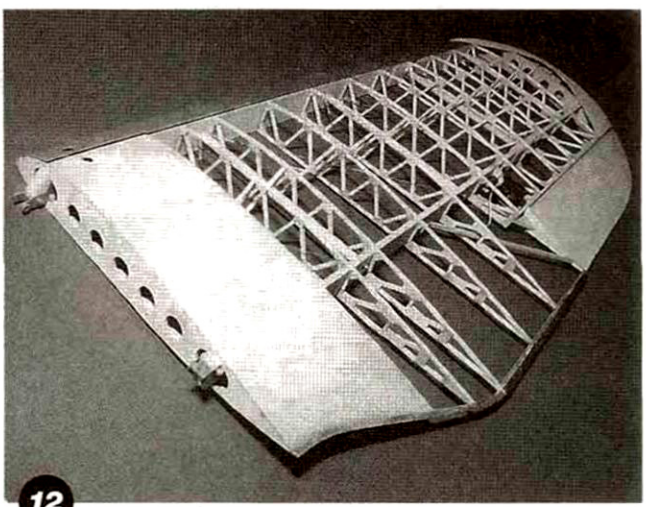
Waco UPF-7 wing during final assembly.



first scale truss rib! It takes about 20 minutes to make a wing rib this way. Obviously, if you are building a Stinson Reliant, where all the wing ribs are different sizes, this method would involve a tremendous amount of work, but for aircraft with a constant-chord wing, it is not as much work as it may appear (photo 9). Some ribs in a scale wing will also be sheathed with a full web of plywood—usually those ribs at the end of a wing panel. Once all the ribs for your wing panel have been made, assemble the ribs and wing spars over the plan and finish building your wing (photo 10). Once it's finished, you may find it hard to cover all the beautiful woodwork. For a scale model builder like me, who is a bit over the edge, there is a great deal of satisfaction in knowing that, underneath, the surface is as scale as it can be. ✈



Waco UPF-7 wings (bottom right ready for covering; left partially complete).



Another shot of bottom right wing (view of top side).

Golden AGE OF R/C

by HAL deBOLT

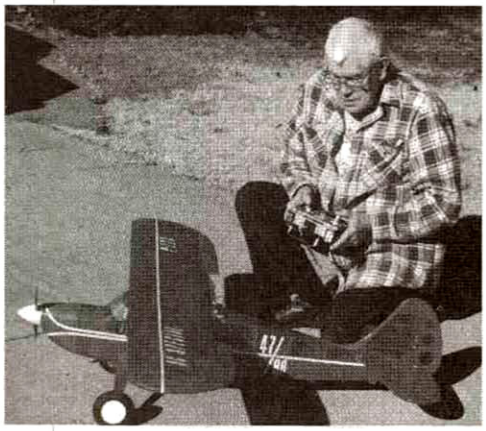
SO...WHAT ARE OT R/C'ERS UP TO NOW?

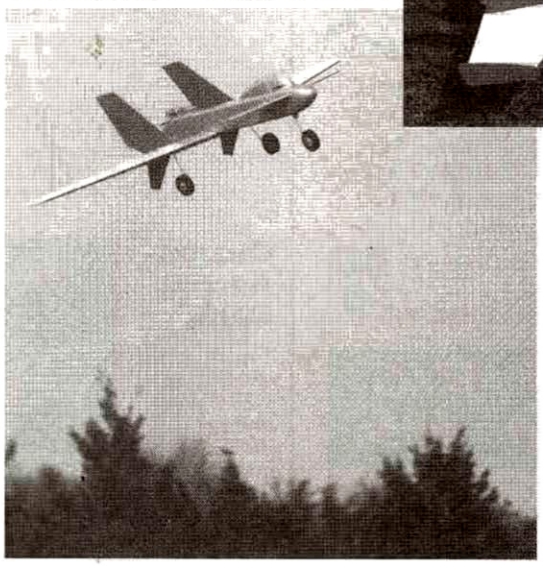
Input from readers suggests an interesting, different phase for our OT R/C discussions. Most of our truly early OT R/C'ers are in their golden years, yet many are still active in the hobby. They've been through the mill, enjoyed "the new" as it arrived and had the opportunity to "do," or at least to see, the changes as they all came about.

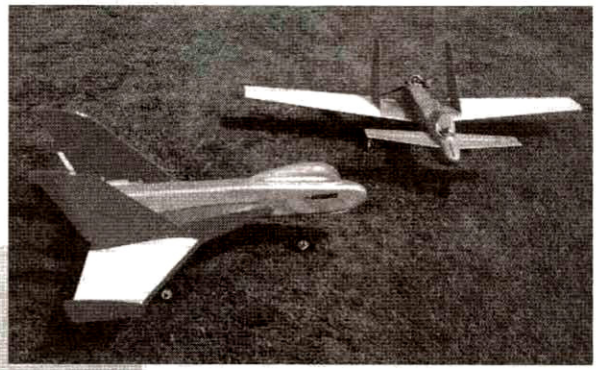
Here's a question: what are our OT R/C'ers doing now? I'll bet it's something dear and interesting to them, so that will be our new theme.

I'll need to hear from you, of course. Do understand, you don't have to be nationally renowned, a Top Gun champion or have done anything more than just enjoy early R/C and remain active in some way. What's needed? A short biography of your R/C days, unusual and interesting experiences, your club associations and, most of all, photos. Please tell us what you're doing these days, too. I hope to hear from you all.

Let's commence with the granddaddy of R/C and friend to all, Bill Winter. Never a competitor, he was responsible for numerous innovations and was a designer and flyer of many hundreds of down-to-earth R/C models—best described as "working man's planes."







Ageless Bill Winter contemplates a replica of his vintage "R/C Special." What a pretty bird! Bill now enjoys seeing his past dreams become reality. Here are a recent flying wing and a canard. Good stuff! Proof of the pudding is Bill's canard on a landing approach. He says that seeing his dreams become reality is a joy of his life.

A lifelong writer for the model press, he served as editor of *Model Airplane News*, *Air Trails*, *American Modeler* and *Grid Leaks*. He also edited several model aviation books. There probably is much more! In his 80s now, Bill continues to be active in modeling. He tells us R/C is a great reason to wake up each day! Healthwise, Bill is short on mobility, so he appreciates the attention he gets from fellow modelers and the collaboration with his friend, John Houton.

At this stage of life, Bill is happy to have done the mundane things; now he can explore all the realms that were just dreams in the past. Bill envisions and designs; John builds and flies. Best of all, you can see their dreams come true as they continue to publish their efforts for us.

We OT R/C'ers are still enjoying modeling, and many of us are still pointing the way!

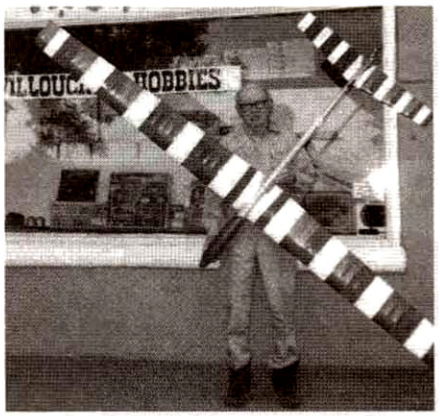
RESTORED KURWI

We had a fine letter from Dale Willoughby, now of Benson, AZ. I recall that Dale worked with Maynard Hill on his R/C glider altitude record. A caption in the June '97 column listed Dale as the other gentleman in a photo of Maynard and his glider, but Dale tells us that the photo was probably taken *after* the flight, back at the Glenview Nats, and that the second man is probably Dan Pruss, the contest director.

If you recall, Dale assisted Maynard by locating thermal activity with his Kurwi glider. Now he tells us that some 30-odd years later, he has restored the Kurwi, and it is flying once more. He adds that the Kurwi was produced in Munich, Germany, by Kurt Wilhelm and was the first glider to feature a fiberglass fuselage. Dale reports that he imported the kits in large quantities at that time.

Dale also tells us he established FAI straight-line glider speed records in '76 and '79. The latter record was set in Pellestouva, Norway (site of the Olympic Games), as Dale traveled the world as an Army officer. He flew his Nelson KA-6 12-foot sailplane through the course at 101mph. That American record was recorded by the Norwegian Aero Klub!

Dale also had a cute experience



Dale Willoughby with the restored Kurwi glider that assisted Maynard Hill's glider altitude record some 30 years ago.

relating to the early use of the 27MHz band. Some early receivers were tuned by using headphones to find the loudest noise (this indicated the strongest signal). In 1957, Dale went to fly at the Portsmouth, VA, field. While he was tuning his receiver, a voice came on the headphones calling "CQ, CQ"—the call sign ham operators use when looking for a response. An operator in Ohio was trying to find someone on our 27MHz frequency!

I'll save more of Dale's antics for another time.

SAD NEWS FROM NEW YORK

A letter from Fred Weaver of Ripley, NY, brought some sad news. While Fred is not an R/C'er, his father, Haylie "Bud" Weaver, could fit the OT R/C'er bill. Fred was sorry to report that Bud passed away in April after an extended illness. He was a stalwart R/C'er in the western Pennsylvania/New York area. Never one to make waves, he was just one of the guys who greatly enjoyed the sport. In the past, Bud filled us in on the old-time activity in his area, which we greatly appreciated. Fred recalls his father taking him to the Toledo and Buffalo R/C shows when he was a youngster. He was very impressed! He has a couple of R/C kits his dad left behind, and he thinks perhaps he will give them a go one day. I'm sure Bud would be pleased to see the Weaver tradition continue.

I want to tell his family of our sorrow and hope all is well with them. Bud has joined a prestigious group of the finest modelers the world has ever seen; God bless them.

MODEL AIRPLANE NEWS

PRODUCT REVIEW

Advanced battery analysis system

by MIKE MAYES

VENCON TECHNOLOGIES

UBAIII plus

IN TODAY'S R/C market, there are a lot of battery testers that are designed to charge, cycle and test flight-system Ni-Cd batteries. Batteries are one of the most important items in a radio-control system and, unfortunately, they are the single most common area of failure.

Marketed by Vencon Technologies*, the "Ultimate Battery Analyzer UBAIII Plus" allows the user to properly test, maintain and archive battery performance data of Ni-Cd batteries used in today's R/C systems. The UBAIII Plus is a fully functional 2-channel battery analyzer and charger that uses the power and versatility of your IBM or compatible PC to record, report and print out the condition of your rechargeable batteries. In addition, this small box works as a stand-alone field-charger.

WHAT MAKES IT WORK?

The UBAIII Plus contains two pulsed constant-current chargers and two programmable constant-current loads (one set per channel), all under full PC control. It can charge and analyze Ni-Cd or Ni-MH battery packs from one to ten cells. It can also be used to charge 6 or 12V gel-cells and wet-cell batteries up to 40Ah. The two channels allow you to test different types of batteries under different charging or load conditions. From the menu, you can select several options.

The first option is "battery test," which tests the battery by controlling its programmable constant-current load and the pulsed constant-current charger. During a battery test, the UBAIII first discharges the battery by turning on the constant-current load. After the battery has been fully discharged, it turns on the constant-current charger. The discharge current, charge current and depth of discharge are all under your control via the computer using the Smart Check software.

Three charge methods are available: timed charging, peak charging and for lead acid or gel-cell batteries.

The second option from the menu is "just charge." In this option, the UBAIII does just that: the charge rate is selectable using one of the predefined battery profiles; or, if you choose, you can create a custom-charge profile that will charge your batteries to their specific requirements. You can choose to charge the battery at a standard rate until it has been charged and then switch to a trickle-rate to maintain it; on the other hand, you may decide to quick-charge the battery pack to a certain level, then switch to a standard charge to complete the charge cycle, again maintaining the charge using a trickle-rate.

The third option is to "graph the discharge curve." This is one of the features that sets the UBAIII apart from other battery-maintenance systems that cannot save and display the charge and discharge curves. The Smart Check software will save a graph of the completed discharge and charge cycle(s). The graph can be displayed on the PC screen, or it can be sent to the printer for a hard copy. The graph file can be saved to disk and recalled later so the battery's history and performance can be reviewed over its entire life.

Fourth on the menu is a "voltmeter" option. Selecting it allows you to measure and display the battery voltage at each channel. If you desire, you can apply a 300mA load to one or both channels.

PC SOFTWARE

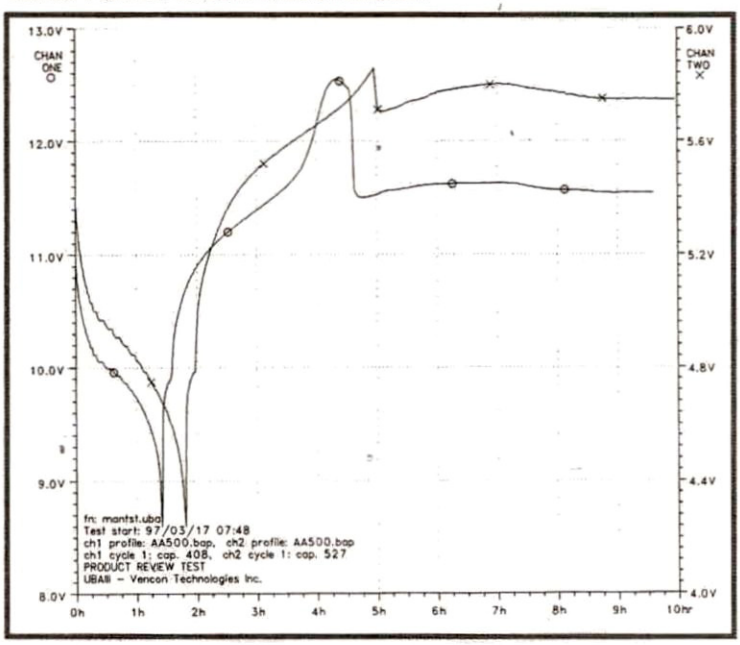
Included with the UBAIII Plus is an interface driver called "Smart Check." This software is loaded into your PC and used to control the charge and discharge rates of the analyzer throughout the battery test; in addition, it will store the test data and save the results. Listed below are the system requirements that are necessary for its operation:

- IBM PC, PC XT, PC AT, PS/2, or 100-percent-compatible computer.
- DOS version 3.1 or above.
- 512K of memory.

To view the discharge curve, you will need one of the following graphics cards: CGA, EGA, VGA, SVGA, or Hercules.

To print the discharge curve, you will need a graphics printer (dot matrix, laser/LED, desk jet, HPGH plotter or

This graph shows the charge printout from the UBA III "O" represents channel number 1 and "X" refers to channel number 2.



PostScript). The Smart Check software is a DOS-based application. The results of each test use about 30K bytes of disk space, depending on the length of the test and the sampling parameters. Operation is straightforward, and the software is user-friendly.

I am a little surprised that the Smart Check software is written as a DOS-based application in today's world of Windows 3.x and Windows 95 operating systems. The instructions do, however, explain how to run under Windows 3.x via a DOS compatibility box, or in Windows 95 via a shortcut. From a Windows user standpoint, I hope the folks at Vencon consider developing a Windows version of Smart Check in the near future. This would allow the UBAIII to operate efficiently in the background mode, yet the computer would still be available for other tasks. Because the UBAIII does not have enough memory to store battery profiles, it relies on the computer to store profile information. Therefore, the computer must be on during the entire battery test. *[Editor's note: Vencon is developing a Windows version that's scheduled for release in December '97.]*

SOFTWARE UPDATES

One really nice feature that Vencon Technologies is offering is free updates to registered owners. The software updates are available on disk or directly over the Internet. For more information you can contact Vencon at its Internet website address at: http://www.batteryTest.com.

CONSTRUCTION

The UBAIII is a very compact and professional-looking unit. The electronics are enclosed in a well-constructed aluminum housing. During operation, the case tends to become a little warm because it doubles as a heat sink for some of the electrical components. Because operational control of the UBAIII is accomplished from a personal computer, the front panel is as simple as it gets: a power LED, two channel-status LEDs, and two sets of banana jacks—one for channel 1 and the other for channel 2. The rear panel is also very simple: an input power jack, an RS-232 port that interfaces to the computer, an RS-232 port that may be used for expansion and finally, a switch that is used to control the UBAIII when it is being used as a field-charger.

FIELD CHARGER

A bonus feature of the UBAIII is its ability to work as a simple field-charger and trickle-charger. In this mode of operation, the UBAIII is a stand-alone device and is not connected to a computer. At the flying field, you can quickly charge and/or maintain both transmitter and receiver packs from a 12V DC source such as a car battery or field-box battery. The field-charger is a

SPECIFICATIONS

No. of channels: 2 (fully independent)

Batteries that can be tested: Ni-Cd, Ni-MH, lead acid, gel-cell and all primary electric cells

Battery voltage (no. of cells): 0 to 15V
Ni-Cd, Ni-MH (10 cells)
Lead acid, gel-cell (6 cells)

Battery capacity: 10mAh to 40Ah

Discharge load: programmable (100mA to 1,000mA in 100mA increments)

Power limit: 10 watts per channel (18 watts per channel with fan upgrade)

Accuracy: ± 0.5%

Capacity results (in mAh): resolution 0.1mAh

Accuracy: 0.5%

Charging method: peak-detection (500mA per channel); timed, 3-stage (1 to 500mA per channel); constant voltage (up to 500mA per channel); combined (doubles max charging current)

Field-charger: full (500mA per channel for one hour); half (250mA per channel for one hour); trickle-charger (12mA per channel indefinitely)

Accessory port: 10-pin header, two extra A/D inputs and bi-directional I/O ports

Power: AC—120 or 230 volts (120VAC wall power supply included); DC—12 volts to18 volts @ 1.1 amps (230VAC wall power supply optional)

Size (WxLxH): 120x170x65mm

Warranty: two years parts and labor

Software included: IBM PC Smart Check software

List price: $199.95 (plus $12 S&H); $49.95, fan upgrade

Features: the UBAIII Plus allows the user to test, maintain and archive battery-performance data for rechargeable batteries. The unit has two fully functional battery-analyzer channels and is capable of recording, reporting and printing this data when used with an IBM or compatible personal computer. Can also be used as a field-charger.

Comments: one thing that is important to remember when cycling batteries is that the best way to check the condition of a battery pack is to compare the latest discharge characteristics of the battery pack to previous discharge characteristics for the same fully charged battery using the same discharge rate.

Hits
- Two independent charging channels.
- Printing of battery data.
- Free software updates to registered owners.

Misses
- From a Windows user standpoint, I hope the folks at Vencon consider developing a Windows version of Smart Check in the near future.

[See editor's note in text.]

UBA III PLUS

timed charger; it does not peak-detect when the batteries are charged. By pressing the small button on the back of the UBAIII, you can select a charge rate of 250mA or 500mA; the batteries are charged at the selected rate for one hour, and then the charge rate is reduced to a trickle-charge at a rate of 12mA indefinitely. The method of charging used by the UBAIII is pulse-current charging, which is better for your batteries than typical continuous-current charging.

POWER SUPPLY

Power to the UBAIII Plus is supplied via a small, external power module. The power module is designed to operate from a standard 115VAC household outlet. An optional 230VAC power module is also available for those who may require it. The output voltage of the power module is low—only about 15VDC. Using an external power module is a good application for the UBAIII, as any heat generated from the power supply is isolated and will not affect the charge or discharge circuitry. From a safety standpoint, the power module indicates that it has both UL and CSA approvals.

ACCESSORIES AND UPGRADES

There are several accessories available for the UBAIII. The accessory that I ordered with the unit for testing was the "fan upgrade." This option enables the UBAIII to discharge up to 1.5 amps per channel and dissipate up to 18 watts per channel. The fan is under computer control and turns on only when necessary. It also keeps the UBAIII cooler when lower rates are used to improve accuracy. Other accessories are:

- 230V power supply.
- Temperature probes (allows battery temperature monitoring during charge).
- D.A.D. Plug'R adapters for Airtronics, Aristocraft, Ace R/C, Futaba, Hitec/World and JR radios.
- 12V field-charger cable (for field-charging your batteries).

A FINAL NOTE

The UBAIII Plus is a versatile, well-designed piece of test equipment that has found a place with me, both in my shop and at the flying field. The unit that I tested worked well and performed as advertised. The only thing that I would like to see different is the addition of enough on-board memory to store battery-test results. This would free up the computer during battery tests. I am sure that the reason the memory was not included in the design of the UBAIII Plus was to keep the cost down.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

MODEL AIRPLANE NEWS

PRODUCT REVIEW

Use any radio frequency!

ARISTOCRAFT

Seeker FM Receiver

by CRAIG TRACHTEN

All week long, you've been waiting to go flying. Saturday's here at last, and you load up your car/van/pickup and head to the field. When you get there, you find out that you're the victim of a catastrophe! Have you ever left your transmitter on the charger at home or grabbed your channel 43 transmitter, forgetting that the model you want to fly is on channel 16? Maybe you tried to beat the waiting game by buying a radio with a frequency that's seldom used at your field, only to find out—*surprise!*—that nine other guys did the same thing!

The Seeker FM receiver from AristoCraft* all but eliminates the above scenarios. This advanced little piece of electronics doesn't require a conventional receiver crystal. Turn it on, press the reset button, and it will "seek" a frequency to receive. Turn on your (or someone else's) transmitter, jiggle the stick that controls channel 1, and the Seeker will tune itself to that frequency! Sound too good to be true? I'm here to tell you: it works!

The Seeker flight pack comes with a 7-channel receiver, three dual-ball-bearing servos, an on/off switch with external charge jack and set button and a 4-cell, flat 500mAh receiver pack. A unique feature of this system is that it allows two battery packs to be installed in your aircraft. One will power the receiver; the other, your servos. A little extra weight will buy you a whole lot of flying. Both packs are turned on/off with one switch. Everything is installed the same as any other flight pack; the only difference is that there's *no* crystal in the receiver. Turn on the receiver (transmitter off) and press the set button. Channel 1—in my case, ailerons—will start to tick back and forth. Be sure your transmitter antenna is extended and that you're at least 25 feet away from any other transmitter. Turn on your transmitter and move the stick for channel 1 fully back and forth. Move it fast enough to make at least two full cycles per second. In a few seconds, the Seeker will seek and find your transmitter's frequency. Channel 1 (as well as all other channels) will respond to your stick input. You're in business!

I installed the Seeker in a Florio Stunt Wagon, a relatively inexpensive fun-fly airplane that gave me a chance to really put the electronics to the test. The flight pack comes with three servos, and the Stunt Wagon needed four, so I grabbed one of my Futaba* servos and plugged it in. My transmitter was a Futaba 8UAF on channel 16. As per instructions, I set the receiver and then flew the airplane. Everything went as planned, with no surprises. So everything went smoothly, big deal! It did what it was supposed to do. *Now* it was time to have some fun! I asked everyone at the field if they would like to fly the Wagon. When I got a "Yes," I asked them to get their transmitters. I said that I wouldn't be a "happy camper" if they crashed, so I wanted

SPECIFICATIONS

Product: AristoCraft Seeker FM receiver

Frequency band: 72MHz

Sensitivity: 5uV/m S/N -20dB

3rd OIP: +4dBm

Channel selectivity: -65dB/7.5 KHz

Changing frequencies: PLL-controlled 50 channels

Frequency accuracy: +/- 5ppm all 50 channels

Modulation compatibility: FM-PPM (auto-setup)

Conversion type: dual conversion

Main battery: 4.8-7.2V (4 to 6 cells)

Sub-battery: 4.8V (4 cells) optional

Circuit current drain: 24mA @ 4.8V

SERVO:

Torque: 43 oz./in.

Speed: 0.2 sec/60 degrees

Weight: 1.5 oz.

Size: 1.6 x 0.78 x 1.43 in.

Voltage: 4.8-6V

Drive: indirect dual ball bearing

List price: $219.95 (Seeker flight pack, part no. ARI-02-2001); $129.95 (Seeker receiver, part no. ARI-03-2100); $24.95 (switch harness, part no. ARI-03-7214); $11.95 (main battery, part no. ARI-03-8206); $19.95 (servo, part no. ARI-03-400)

Features: the Seeker is a 7-channel FM receiver that automatically matches itself to the frequency of your transmitter. It will recognize 27, 72 and 75MHz, foreign frequencies and 5 meter. When ordering, specify which band you require.

Comments: turn the Seeker on, press the reset button, and it will "seek" a frequency to receive. Turn on your (or a borrowed) transmitter, jiggle the stick that controls channel 1, and the Seeker will tune itself to that frequency! Sound too good to be true? I'm here to tell you that it works!

them to use the transmitter they were comfortable with—*theirs*. After my request, I got more cross-eyed stares than I could count. (Most of the guys in our club own Futaba transmitters, so there wasn't any channel-switching to be concerned with.) I was sorry I didn't have my camera with me to catch their facial expressions as they took off using their own radios.

I also borrowed some JR transmitters to see if the Seeker would recognize them; no problem. Because channel allocation is different between Futaba and JR, though, (channel 1 is aileron with Futaba and throttle with JR), I didn't fly with a JR transmitter. I didn't want to open the aircraft and change the servo plugs around, so I just tested for response. The Seeker responded to stick movements just as well as the receivers that come with the radios.

We tested 20 to 25 different channels, and the Seeker worked with all of them. Now that I have a Seeker, I've got the *ideal* "never worry about going to the field and having to wait to fly" situation. One of my friends had a Hitec/RCD* Spectra synthesized RF module in his transmitter. This module allows you to set the frequency you want to transmit on, so you can go to the field with aircraft on different frequencies and take only one transmitter with you. (The module also works in the Futaba Super 7 and 8UAF radios). I took the RF Module, put it in my radio and tested at least 20 frequencies. If you own a transmitter with the synthesized RF module and AristoCraft's Seeker, you'll never have to worry about who's going to show up at the field using "your" channel. Now they're *all* yours.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.* ✦

Hits

- Eliminates concern about buying receivers on your radio's channel.
- With a channel-selectable transmitter, all frequencies are "yours."
- Easy, step-by-step installation and setup instructions.
- Allows installation of a second onboard battery pack.

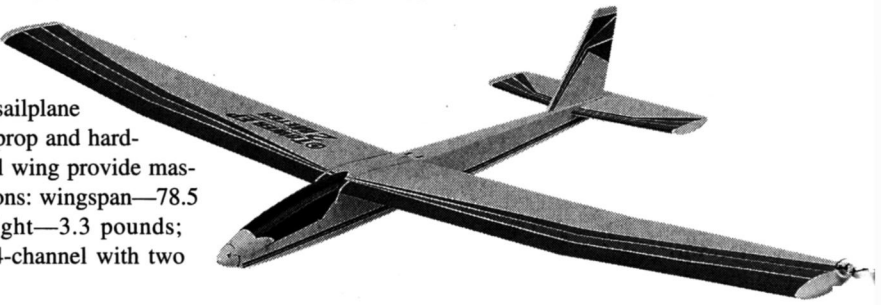
Misses

- Receiver is a bit large for small models.

LATEST PRODUCT RELEASES

TOWER HOBBIES

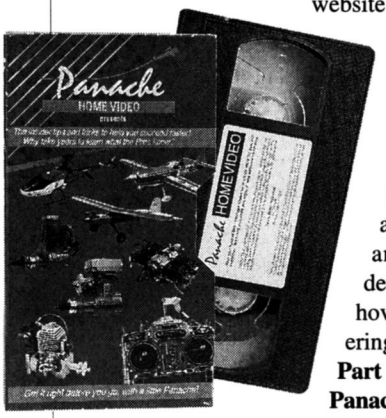
EP 2-Meter Sailplane ARF



Ideal for first-time sport flyers, this all-wood sailplane trainer comes with a Mabuchi motor, folding prop and hardware. Its high wing and flat-bottom polyhedral wing provide massive lift and slow, gentle handling. Specifications: wingspan—78.5 inches; wing area—591 square inches; weight—3.3 pounds; length—39.25 inches; radio required—3- or 4-channel with two standard servos.

Part no.—TOWA4000; **price**—$99.99.

Tower Hobbies, P.O. Box 9078, Champaign, IL 61826-9078; (217) 398-3636; website **http://www.towerhobbies.com/**.



PANACHE PRODUCTIONS

R/C Basics: Learn to Set Up and Hover

This new, 1-hour VHS video helps take the fear out of learning to fly an R/C helicopter by answering the questions most often asked by new pilots. It covers setup procedures for the linkages and radio system; details the necessary field equipment; and describes flying field procedures, suggested training aids and basic hovering techniques. It concludes with segments on advanced hovering and safety tips.

Part no.—PCHZ1011; **price**—$29.99.

Panache Productions; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

REDINGTON CUSTOMS

Fuel Recycler

This sealed, fuel-resistant recycler comes with a vent tube and an 18-inch-long fuel transfer tube and meets all gas and glow fuel-storage requirements.

Prices—$6.95 plus S&H (glow/8 oz.), $7.95 plus S&H (glow/16 oz.), $9.95 plus S&H (gas/16 oz.).

Redington Customs, Stuart, FL; (561) 220-8108.

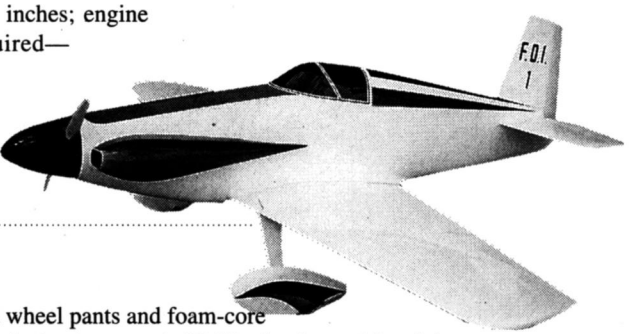
GREAT PLANES MODEL MFG.

.40 Corsair ARF

The first factory-built and -covered .40-size scale Corsair available, this latest model in the Legendary Warbirds Series features concealed elevator and rudder-control linkages, a round cowl that fits the fuselage perfectly, Great Planes hardware, fixed landing gear and a photo-illustrated instruction manual. Specifications: wingspan—55.75 inches; wing area—604 square inches; weight—5.5 to 6 pounds; length—45.75 inches; engine required—.45 to .52 2-stroke or .70 to .80 4-stroke; radio required—4-channel (5-channel if flown with optional retracts).

Part no.—GPMA1530; **price**—$339.99.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008; website **http://www.hobbies.net/gpm/**.



FIBERGLASS DESIGN INC.

Midget Mustang Racer

This 50-percent scale model features a composite fuselage, cowl and wheel pants and foam-core wings (built-up wings and composite wings are options). It has a 111-inch wingspan, is 98.5 inches long and weighs approximately 30 pounds. A 3W, 1.20 engine is recommended for power.

Price—$895 (basic kit).

Fiberglass Design Inc., 360-A N. Miami St., West Milton, OH 45383; (800) 548-3383; fax (937) 698-6486.

CLASSIFIEDS

BUSINESS

SCALE AIRCRAFT DOCUMENTATION and resource guide. Larger, updated 1997 edition. World's largest commercial collection. Over 6,400 different color Foto-Paaks and 35,000 three-view line drawings. 204-page resource guide/catalogue—$8; Canada—$10; foreign—$15. Bob Banka's Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626; (714) 979-8058. [3/98]

BUILDING SERVICE. Trainers to jets! We build them. You fly them. We are at the leading edge of R/C aircraft assembly technology. (407) 359-5387; (407) FLY-JETS. We specialize in trainers, sport, scale, giant scale & jets. www.iag.net/~aircraft, or email aircraft@iag.net. [11/97]

AERO FX BY JO DESIGNS—exact-scale, computer-cut, high-performance vinyl graphics and paint masks. Lettering; nose art; insignia for scale; pattern, pylon and sport fliers; complete graphic sets available. Call or write for free sample and catalogue. JO Designs, Rt. 1, Box 225 AA, Stratford, OK 74872; (405) 759-3333; fax (405) 759-3340. [11/97]

GIANT-SCALE PLANS BY HOSTETLER. Send SASE to Wendell Hostetler's Plans, 1041 Heatherwood B, Orrville, OH 44667. Phone (330) 682-8896; fax (330) 683-5357; http://www.aero-sports.com/whplans. [6/98]

SODA-CAN AIRPLANES—replica biplane detail plans with photos, $7.50 PPD. Early's Craft, 15069 Valley Blvd. SP 26, Fontana, CA 92335. [8/98]

REPLICA SWISS WATCHES—18KT gold-plated! Lowest prices! Two-year warranty! Waterproof divers, chronographs, others! Phone (770) 682-0609; fax (770) 682-1710.

SUNGLASS DISCOUNTS—Serengetti, RayBan, Randolph, Vuarnet, Gargoyles, Bolle, Revo, Hobie. Free catalogue. RJS Accessories, (800) 226-7571. [11/97]

GEE BEE PLANS used for full-scale R-2, "Z." Ten airplanes, 1/3-1/24. Catalogue/News $4. Vern Clements, 308 Palo Alto, Caldwell, ID 83605; (208) 459-7608. [12/97]

LARGE-SCALE SAILPLANES AND TOWPLANES—new and used—call (212) 879-1634, Sailplanes Unlimited, 63 East 82nd St., New York, NY 10028. www.sailplanes.com. [11/97]

R/C SKYDIVING: Thrilling free-falls, chute opens by transmitter. Parafoil Parachute duplicates all canopy maneuvers, turns, stalls, spirals, landing flares, etc. Latest catalogue $1. R/C Skydivers, Box 662M, St. Croix Falls, WI 54024. [10/97]

PLANS—R/C sailplanes, scale, sport and electric. Old-timer nostalgia and FF scale and sport-powered, rubber and towline. All models illustrated. Catalogue $2. Cirrus Aviation, P.O. Box 7093, Depot 4, Victoria, BC V9B 4Z2 Canada. [3/98]

MAKE REAL DECALS with your computer and printer. Send $10 for introductory kit to LABCO, Dept. MAN, 27563 Dover, Warren, MI 48093. http://www.mich.com/~labco/. [3/98]

NEW ZEALAND AERO PRODUCTS. Scale plans: Agwagon, Airtruk/ Skyfarmer, Pawnee, Pawnee Brave, Fletcher FU-24, DC-3/C-47, Cessna 152 Aerobat, Hall's Springfield Bulldog, Fairchild PT-19, Fleet PT-26, Rearwin Sportster, Typhoon and more. Hardware packs, color photo packs available. Free documentation with plans. Catalogue/price list: $5 (U.S.); Visa/MC. 34 Ward Parade, Stirling Point, Bluff, New Zealand. Phone/24 hr. fax: 643-2128192. [3/98]

WW I PLANS. Over 600 in stock. Laser-cut parts. Printed lozenge tissue. Send $5 for illustrated catalogue to Clarke Smiley, 23 Riverbend, Newmarket, NH 03857. [4/98]

FLYRITE BUILDING SERVICE. Experience in fine detail and craftsmanship of any kit. Top Flite, Great Planes, Midwest, Goldberg, Sig, etc. From box to air. (513) 755-8894. [2/98]

SAITO ENGINE REPAIRS. Now available at A-Train Hobby by the Oldtimer. Other gas engine repairs also available. A-Train Hobby, 13503B Southeast Mill Plain Blvd., Vancouver, WA 98684; (360) 944-5403. [11/97]

PRESSURE JET ENGINE GLUHAREFF G8-2 5 lbs. to 40 lbs. thrust, plus. Push-button starting. No moving parts. Propane powered. Successful multiple uses. 16-page, illustrated catalogue, $5. Jet Wind Co., 1624 Burnett St., Long Beach, CA 90806; (562) 427-2655, (213) 258-9313; fax (562) 427-3126. [11/97]

HELICOPTER SCHOOL: Five days of hands-on instruction with X-Cell helicopter and Futaba and JR Radios. Small classes, tailored to meet your individual needs, beginning to experts. Includes all meals and lodging. Over 520 satisfied students from 23 countries and 44 states, logging 20,000 flights in the last seven years. Located on a 67-acre airport used exclusively for R/C training. Owned and operated by Ernie Huber, five-time national helicopter champion and designer. Send for free information and class schedule NOW! R/C Flight Training Center, P.O. Box 727, Crescent City, FL 32112; (800) 452-1667; fax (904) 698-4724. Outside of U.S., (904) 698-4275. www.RCHELICOPTER.COM. [11/97]

NORTHWEST AG AIRCRAFT is the U.S. agent for New Zealand Aero Products' fine line of scale plans, documentation, and new fiberglass accessories. Call or write for a catalogue of these award-winning Ag aircraft and many more! Only $5. Route 4, Box 575-28, Astoria, OR 97103; phone/fax (503) 458-6686. [12/97]

MAKE YOUR OWN ROCKET MOTORS!!! Homemade solid and composite fuels power R/C gliders, model rockets, etc. Smoke tracers for R/C planes & choppers, electric igniters, cannon fuse "chemicals," lab acids, glassware, "How-to" Books, videos, rocket motor kits, "huge" catalogue $2. Pyrotek, P.O. Box 300, Sweet Valley, PA 18656; (717) 256-3087. [2/98]

ELIMINATE CARBON, VARNISH AND OVERHEATING PROBLEMS and reduce engine wear with QX-500 R/C Fuel Treatment. Send $1 or 3 stamps for sample. LubeTech, 10620 Nevada St., Melrose Park, IL 60164. [11/97]

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ENGINES: IGNITION, GLOW, DIESEL—new, used, collectors, runners. Sell, trade, buy. Send $3 for huge list to Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537. [11/97]

MODEL AIRPLANE NEWS, 1930-1980; "Air Trails," 1935-1952, "Young Men," 1952-1956; "American Modeler," 1957-1967; "American Aircraft Modeler," 1968-1975. $1 for list. George Reith, 3597 Arbutus Dr. N., Cobble Hill, B.C., Canada V0R 1L1. [3/98]

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WANTED: Old, unbuilt, plastic model kits from '50s and '60s. Send list, price to Models, Box 863, Wyandette, MI 48192. [3/99]

USED ENGINES WANTED. Cash or trade. T. Crouss, 100 Smyrna, West Springfield, MA 01089. [8/97]

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WANTED: Futaba single stick helicopter radio. Complete system or transmitter only. (814) 825-8404. Bob Vomero. [2/98]

WANTED: Plans and instructions for Marutaka Cessna L-19 Bird Dog kit. Mike Gosselin, 10 Rivercove Dr., Cromwell, CT 06416; (860) 635-0413. [11/97]

JET HANGAR HOBBY JETS—A4 Skyhawk & Panther, 2 Turbex units. 7.5 KB engine and Rhom retracts. NIB $1,000. (801) 623-4635. [11/97]

WANTED: do you have a Flyline Models Megowcoupe #S-203 NIB you could sell to an appreciative modeler? Please contact Gary Guckel, P.O. Box 1106, Meadow Vista, CA 95722. (916)878-1938. [11/97]

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RELIVE 30 SECONDS OVER TOKYO!! Your chance to own a fabulous twin engine B-25 made by Wing Manufacturing! A dream prize worth more than $1,500 consisting of this fantastic kit complete with engine and machine gun details, two (2) Saito Gold Knight .56 4-stroke engines, JR XP642 Computer Radio, complete Robart pneumatic retract system, Coverite aluminum covering, Du-Bro wheels and hardware package will be raffled at the Midwest's largest RC Swap Shop and newest EXPO! This event is sponsored by the Hobbytime Flyby Knights, AMA 3763, on Sunday, October 26th, 1997, in the main exhibition hall at the DuPage County Fairgrounds, Wheaton, Illinois. Raffle tickets are $1 each or 6/$5. Raffle or admission tickets may be purchased by mail/phone/fax or in person at the EXPO. Credit cards accepted for tickets or Exhibit Spaces. Call (630) 837-8437/fax: 7239 or mail your order to Hobbytime Flyby Knights, Hangar 369, 369 Army Trail Rd., Bloomingdale, IL 60108. Winner need not be present. [11/97]

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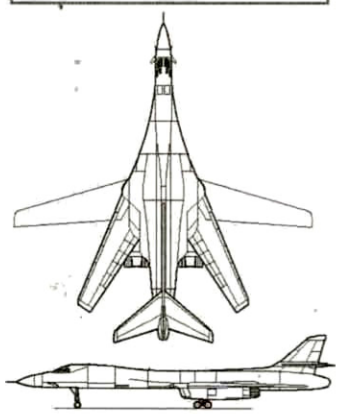

Name THAT PLANE

CAN YOU IDENTIFY THIS AIRCRAFT?

Send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606.

Congratulations to Alan Brown of Watsonville, CA, who easily identified the August '97 mystery plane because he worked as an apprentice on a later version of the British Navy interceptor fighter. The Blackburn B-37 Firebrand F. Mk II was photographed in 1943 during its deck-landing trials on board the *HMS Illustrious*. The single-seat aircraft was armed with two 20mm Hispano cannons in each wing and was powered by a 2,305hp Napier Sabre III, liquid-cooled, 24-cylinder engine turning a de Havilland three-blade, variable-pitch propeller. It had a 51-foot wingspan and was 38 feet long.

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

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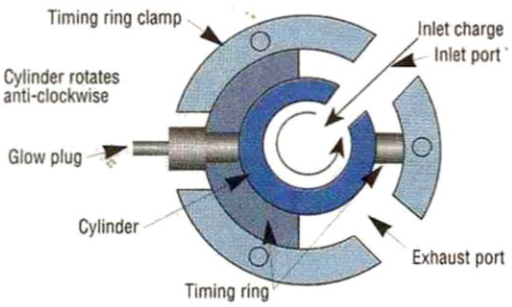
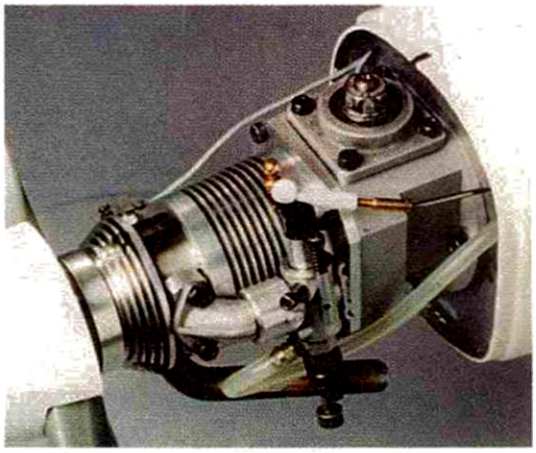
ADVERTISER INDEX

ROTARY CYLINDER VALVE

You're probably thinking exactly what I did when my eyes first gazed on the RCV 60 (.60ci) engine. "Rotary cylinder?! They can't mean that literally ... can they?" "They" can, and they *do* use the term as a literal description. Yes, it's true; the cylinder sleeve turns; in fact, the cylinder sleeve, rotary-drum valve and prop shaft make up a single, inline, rotating component. Sounds strange, but it's really quite simple. The crankshaft, whose axis in this case is perpendicular to the thrust line of the airplane it's mounted in, turns a beveled gear that meshes with a beveled ring gear that's machined into the bottom edge of the cylinder sleeve, thereby turning the cylinder/drum-valve/prop-shaft unit. This multi-task rotary component is supported at the front, somewhat conventionally, by a caged ball-race bearing unit at the base of the prop-shaft and, at the rear, quite unconventionally, by a large bronze bushing that captures the cylinder sleeve just in front of the beveled ring gear. You with me so far?



Induction, exhaust and glow ignition are all carried out by means of the drum valve that's between the cylinder top and the prop shaft. Machined in this drum is a 90-degree duct. One end of the duct alternately passes over the intake port, ignition window (in which the glow plug sits) and exhaust port. The other end of the duct leads to the center of the combustion chamber (see? I told you it was simple). I almost forgot! The cylinder, hence the prop shaft, rotates once for every two crankshaft rotations. Yes! It's a 4-stroke/cycle engine.



Having the prop bolted to the top of the rotary cylinder instead of to the crankshaft does give the design an obvious scale-modeling advantage: it's streamlined and will fit into otherwise difficult cowled-in situations. Also, the designer has put the crankshaft end to use by passing it through the crankcase side as a convenient and safe starting drive. Inventor Keith Lawes claims the RCV 60 prototype is easy to start and will turn a 16x12 prop at 4,500rpm producing 5 pounds of thrust on 5-percent-nitro fuel. While a torque benefit is obviously the result of the 2:1 reduction ratio, because of the linear porting dynamics a rotary valve offers, attaining high horsepower outputs is a dubious affair, in my humble opinion. I have run several Webra 4-strokes that use an overhead rotating tube with flute holes machined in them for induction and exhaust in lieu of poppet valves. This system has similar breathing dynamics to that of the RCV 60, and while it's a very simple and reliable mechanism that produces respectable torque, it does not supply the high-rpm breathing necessary to produce power output comparable to that of a poppet-valve 4-stroke engine of similar displacement. Simply put, the opening and closing of a rotary valve is linear, while that of a poppet valve is exponential. A poppet opens faster and stays open longer. No contest.

When I first heard of the engine, I was sure the piston ring would have been fitted on some type of roller-bearing system so as to rotate with the cylinder sleeve. This is not the case, and it concerns me. In this engine, we have the piston moving in a conventional linear path combined with the sleeve's lateral rotation around it. This sets up a multi-directional wear pattern that brings into question the piston/sleeve fit over the long term.

One other feature I would like to see addressed is the straight beveled gears. Helical-cut gears are quieter and far more efficient. To be fair, the engine is in the prototype stage (production plans are in the works for the very near future), and both of these concerns could be addressed in production versions.

On the side of the RCV is its compact simplicity and tremendous novelty appeal for the mechanically curious—the latter being an extremely appropriate quality in my book; after all, the realm of R/C airplanes is a world fraught with creative ingenuity—one of the things that keeps me coming back to this hobby.

For more information, contact RCV Engines Ltd., 6 Haviland Rd., Ferndown Industrial Estate, Wimborne, Dorset, England, GB BH21 7RF; phone +44 (0) 1202 877044; fax: +44 (0) 1202 861210.

—Chris Chianellli